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FAO Fisheries Synopsis No. 125, Volume 3 FIR/S125 Vol. 3

FAO SPECIES CATALOGUE

VOL. 3 CEPHALOPODS OF THE WORLD

AN ANNOTATED AND ILLUSTRATED CATALOGUE OF SPECIES OF INTEREST TO FISHERIES

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This sheet is to be included in the following publications:

FAO FISHERIES SYNOPSIS No. 125, Vol. 3
FAO Species Catalogue Vol. 3, *Cephalopods of the World*
M-40
ISBN 92-5-101382-9

FAO FISHERIES SYNOPSIS No. 125, Vol. 4, Part 1
FAO Species Catalogue Vol. 4, Part 1, *Sharks of the World*
M-40
ISBN 92-5-101384-5

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FAO SPECIES CATALOGUE

VOL. 3 CEPHALOPODS OF THE WORLD

An Annotated and Illustrated Catalogue
of Species of Interest to Fisheries

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UNITED NATIONS DEVELOPMENT PROGRAMME

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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PREPARATION OF THIS DOCUMENT

The present publication, prepared under the UNDP/FAO Project for the Survey and Identification of World-Marine Fish Resources (GLO/82/001), is the third worldwide species catalogue issued within the FAO Fisheries Synopses series.

The catalogue has been based, to a large extent, on previous FAO publications on this subject, in particular the FAO Species Identification Sheets for Fishery Purposes (Fishing Areas 37, 31 and 34/47), and on field experience acquired by the first two authors in the course of a two-months long UNDP/FAO mission through the Indo-Pacific area carried out in 1979. Information on habitat, biology and fisheries was mostly gathered from literature by the third author.

The indexes of scientific and common international FAO species names and of local species names were prepared in collaboration with FAO's Fishery Information, Data and Statistics Service.

Illustrations were adapted and redrawn by a wide variety of sources, especially from Okutani (1980).

Illustrators : P. Lastrico, FAO, Rome (principal illustrator); M. Schotte, Washington, D.C.; O. Lidonnici, FAO, Rome (distribution maps).

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ABSTRACT

This is the third in the FAO series of worldwide annotated and illustrated catalogues of major groups of organisms that enter marine fisheries. The present volume includes 173 cephalopod species of actual or potential fishery interest, belonging to the Nautiloidea (nautiluses), Sepioidea (cuttlefishes), Teuthoidea (squids) and Octopoda (octopuses). It provides a comprehensive and illustrated key to all the 43 cephalopod families, with a glossary of technical terms and measurements. Within each family are given individual accounts of species, which include drawings, scientific and vernacular names, information on habitat, biology and fisheries, and a distribution map; for most families there is also a key to genera. The work is fully indexed and there is ample reference to pertinent literature.

Distribution :

Authors
FAO Fisheries Department
FAO Regional Fisheries Officers
Regional Fisheries Councils
and Commissions
Selector SM

For bibliographic purposes this document should be quoted as follows :

Roper, C.F.E., M.J. Sweeney & C.E. Nauen, FAO
1984 species catalogue. Vol. 3. Cephalopods of the world. An annotated and illustrated catalogue of species of interest to fisheries. FAO Fish. Synop., (125)Vol. 3:277 p.

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FOREWORD

This publication is the third in a series of worldwide species catalogues that FAO is producing with financial support from UNDP. The series was initiated in 1980 with the publication of "Shrimps and Prawns of the World", by L.B. Holthuis, and will continue periodically with similar catalogues for other groups of major interest to fisheries.

The present catalogue represents FAO's first attempt toward a worldwide annotated and illustrated inventory of the cephalopod species presently utilized or believed to be of potential interest to mankind. It is aimed primarily at individual workers and institutions concerned with cephalopod fisheries. It is a source of wide-ranging basic information by species relevant to aspects of identification, biology, fisheries, and marketing, as well as representing a coded system of scientific and standardized vernacular names.

The recent development of new cephalopod fisheries, based to a large extent on species that traditionally have not been exploited, poses new problems of species resources identification and management. At the same time, such development results in an increasing amount of new information and data, much of which are unpublished or confined to reports of restricted distribution and hence, are difficult to access. Because of this, the present version of this catalogue should be viewed as a working document capable of improvement and expansion as additional information and data are accumulated from our continuing efforts, as well as from the users.

In an effort to alleviate this situation, a computer-based, subject classifier or indexed bibliography of cephalopod literature is being built at the Smithsonian Institution in collaboration with FAO and the US National Marine Fisheries Service.

Furthermore, an international group of cephalopod experts has been established for the purpose of providing information and services to fishery agencies and other organizations and groups interested in cephalopods. The Cephalopod International Advisory Council (CIAC) answers queries concerning systematics, biology, fisheries, etc., sponsors workshops and training courses, and serves as a source of information exchange through a newsletter and pamphlets. For further information contact the first author of this catalogue.

As an outgrowth of this catalogue, FAO will consider the development of a computerized species data base on cephalopods to be progressively further expanded as new information becomes available.

In order to strengthen the usefulness of this information service, we strongly encourage users of this catalogue to share in keeping it up-to-date, thus rendering it more useful by providing us with new information to be used in publishing future editions. All suggestions, corrections, and additional information should be sent to the editors or the authors. Problems concerning species identifications should be addressed to the authors. Also, copies of publications of any sort that deal with cephalopod biology and fisheries will be of great value to and much appreciated by the authors.

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CEPHALOPODS OF THE WORLD

TABLE OF CONTENTS

Page

1. INTRODUCTION 1
  - 1.1 Plan of the Catalogue 2
  - 1.2 General Remarks on Cephalopods 3
  - 1.3 Illustrated Glossary of Technical Terms and Measurements 7
  - 1.4 Key to Orders and Families 15

2. **CHAMBERED NAUTILUSES (Order Nautiloidea)** 25
  - 2.1 Family Nautilidae 25

3. **CUTTLEFISHES (Order Sepioidea)** 27
  - 3.1 Family Sepiidae 27
  - 3.2 Sepiadariidae 60
  - 3.3 Family Sepiolidae 64

4. **SQUIDS (Order Teuthoidea)** 79
  - 4.1 Family Loliginidae 80
  - 4.2 Family Enoploteuthidae 120
  - 4.3 Family Octopoteuthidae 124
  - 4.4 Family Onychoteuthidae 125
  - 4.5 Family Gonatidae 135
  - 4.6 Family Psychroteuthidae 144
  - 4.7 Family Lepidoteuthidae 145
  - 4.8 Family Architeuthidae 147
  - 4.9 Family Histioteuthidae 148
  - 4.10 Family Neoteuthidae 152
  - 4.11 Family Bathyteuthidae 153
  - 4.12 Family Brachioteuthidae 154
  - 4.13 Family Ommastrephidae 156
  - 4.14 Thysanoteuthidae 187
  - 4.15 Family Cranchiidae 188

Page

5. OCTOPUSES (Order Octopoda) 191

  5.1 Family Octopodidae 191

  5.2 Family Argonautidae 225

6. CLASSIFICATION OF THE GENERA OF RECENT CEPHALOPODS 227

7. LIST OF SPECIES BY MAJOR FISHING AREAS 229

8. BIBLIOGRAPHY 243

9. INDEX OF SCIENTIFIC AND INTERNATIONAL FAO NAMES 259

10. INDEX OF LOCAL NAMES 273

1. INTRODUCTION

With the stabilization of world finfish catches in general, and the depletion of a number of fish stocks that used to support industrial-scale fisheries, increasing attention is now being paid, to the so-called unconventional marine resources which include many species of cephalopods. A first general review of the world's cephalopod resources, in particular in regard to their exploitation and future potential, was prepared for FAO by G.L. Voss in 1973. Since the publication of this document, the growing number of cephalopod species entering commercial fisheries as a result of the extenson of fisheries operations to new fishing areas and to deeper waters, calls for a refinement of species identifications and for better compilation of pertinent information by species on distribution, biology and fisheries of these species. Okutani's (1980) well-illustrated book on "Useful and latent cuttlefishes and squids" was of great help to us in our attempt to make the present document as comprehensive as possible.

This catalogue includes: (i) species of cephalopods exploited commercially; (ii) species utilized at the subsistence and artisanal levels, even those which comprise only a minor percentage of the catch; (iii) species considered to have a potential value to fisheries, based on criteria such as edibility, suspected abundance, accessibility, etc. The inclusion of such a wide range of species appears justified in order to give the catalogue the character of a comprehensive inventory of species useful to mankind, regardless of their current commercial status.

The catalogue is based primarily on information available in the literature. Unpublished reports and working documents also have been used as far as possible. This information was supplemented by field observations made by the authors in several parts of the world. Particularly informative was a two-months FAO/UNDP sponsored field trip of the first two authors through the Indo-West Pacific area which gave us the opportunity to examine fresh material at landing sites, markets and laboratories, as well as to obtain first-hand information about local cephalopod fisheries from regional fisheries workers. Furthermore, valuable information was supplied to us by colleagues knowledgeable about various aspects of cephalopod fisheries.

Sometimes it has proved very difficult to evaluate the reliability of published data. It is quite understandable that field workers far away from good library facilities have difficulties in correctly identifying the species they encounter in the field. Moreover, the discovery of new species, the more correct delimitation of known species, or even the introduction of nomenclatoral changes, may cause confusion and lead to the use of scientific names that are incorrect by modern standards or that apply to more than one species. Although great care was exercised in evaluating the published information used in the catalogue, some misjudgements and incorrect interpretations undoubtedly have occurred. Another difficulty is that in taxonomic literature information on economic importance of species is rather scarce or of a very general nature. Also we may have overlooked important information in relevant fisheries literature that is difficult to locate or available only locally.

Readers who are interested in information related to cephalopods resources and biology beyond the scope of this catalogue are referred some of the more recent sources:

- Expert consultation on fisheries for squid and other cephalopods, held in Japan in September 1975 (FAO, 1976).
- The recent workshop on Biology and Resource Potential of Cephalopods, held in Melbourne, Australia, in April 1981 (Roper, Lu & Hochberg (eds), 1983)..
- Accounts on the cephalopod stocks in the eastern central Atlantic (Special Working Group on Cephalopod Stocks in CECAF (FAO/UNDP, 1982) and in the Indo-Pacific (Indo-Pacific Fishery Commission, 1982) and advances in the assessment of world cephalopod resources (Caddy, ed., in press).

Acknowledgements

The authors are pleased to acknowledge the contributions of persons who supplied information or read drafts of this catalogue. Without their good efforts this work would have been a mere skeleton. W. Fischer (FAO, Rome) was the initiator of this project and without his very much appreciated support and encouragement this publication would not have been forthcoming. We thank most kindly G.L. Voss (Rosenstiel School of Marine and Atmospheric Science, University of Miami, Florida), W.F. Rathjen (National Marine Fisheries Service, Gloucester, MA), and T. Okutani (National Science Museum, Tokyo) for their critical review and helpful corrections from sources unavailable to us and from unpublished data.

Early in 1979 the first two authors travelled for FAO to 11 countries in the eastern Indian Ocean and the western central Pacific (FAO Fishing Areas 57 and 71) to gather information for the Cephalopod Identification Sheets for those areas, and we wish to thank most heartily all the FAO and UNDP personnel, as well as the biologists and administrators from laboratories and universities in each country who so generously and willingly provided specimens, data, logistical support, information and hospitality. Their assistance has been a major contribution to this catalogue.

Of course, a compilation of this nature must rely heavily on already published works. We acknowledge with gratitude T. Okutani, G.L. Voss, W. Adam, S.S. Berry, J. Wormuth, R. Toll and F. Palacio whose monographic and revisionary works have been most helpful to us (see bibliography). Most especially we acknowledge here that many illustrations from the works of these (and other) authors have been redrawn for the purposes of this catalogue.

Cephalopod workers especially will appreciate that for many species either no or very poor illustrations exist in the literature. We acknowledge with special thanks Paolo Lastrico and Marylin Schotte for the excellent job they have done in redrawing and greatly enhancing many illustrations from the literature, and Giulia Sciarappa-Demuro for her invaluable collaboration in typing and skillfully page-composing this highly technical and complex document on a word processor. Special thanks are also due to Ingrid Roper for her technical assistance during the final stages of preparing this catalogue for printing.

1.1 Plan of the Catalogue

This catalogue is arranged systematically by higher classification down to family and generic level, then alphabetically by species. Each major group and family is introduced with general descriptive remarks, illustrations of diagnostic features, highlights on the biology, and relevance to fisheries. The information pertaining to each species is arranged by categories as follows: (1) scientific name, (2) synonymy, (3) FAO species names, (4) diagnostic features with illustrations, (5) geographical distribution with map, (6) habitat and biology, (7) size, (8) interest to fisheries, (9) local species names, (10) literature, and (11) remarks.

(1) **Scientific name :** Reference is given to the original description of each species so no confusion will arise as to precise identification.

(2) **Synonymy:** Synonyms and different name combinations are listed (misidentifications and other nomenclatorial problems are discussed under (11) Remarks).

(3) **FAO species names :** English, French and Spanish names for each species, to be used primarily within FAO, were selected on the basis of the following criteria: (i) each name must apply to one species only, in a worldwide context; (ii) the name must conform to FAO spelling nomenclature; (iii) the name should not lead to confusion with major groups other than cephalopods. Wherever possible, the denominations selected were based on vernacular names (or parts of names) already in existence within the areas where the species is fished. FAO species names are, of course, not intended to replace local species names, but they are considered necessary to overcome the considerable confusion caused by the use of a single name for many different species, or several names for the same species.

(4) **Diagnostic features :** Distinctive characters of the species are given as an aid for identification, accompanied by pertinent illustrations. Species identifications should be attempted only after verification of the family through use of the illustrated key to families. However, caution must be exercised in using the specific key characters given here, and it is strongly suggested that species identifications be verified, whenever possible, through primary literature or by cephalopod experts. Reference to FAO Species Identification Sheets is given wherever relevant.

(5) **Geographical distribution :** The entire known geographic range of the species, including areas of seasonal occurrence, is given in the text and shown on a small map. In cases where only scattered records of occurrence are available, interrogation marks have been used to indicate areas of suspected or unconfirmed distribution.

(6) **Habitat and biology :** The known depth range of the species and information on salinity and temperature of its habitat are given where known. Information on biological aspects, such as migrations, spawning seasons and areas, longevity, food, and predators, also is included.

(7) **Size :** The known mantle length (or total length in some cases) of both males and females is provided where possible. Total length is measured from the posterior tip of the mantle to the anterior tip of the outstretched tentacles (squids and cuttlefishes) or arms (octopuses), but because of the elasticity of tentacles and arms total length is not a very accurate measurement. Mantle length, the standard measure of size in cephalopods, is measured along the dorsal midline from the posterior tip of the mantle ("tail") to the anterior border of the mantle (squids and cuttlefishes) or to the level of the eyes (octopuses) (see Chapter 1.3). Where both total length and mantle length are given, the respective figures do not necessarily pertain to the same specimens but may have been obtained from different sources. The available information on the size attained by some species often is very meagre, so the maximum size cited here may be well below the actual maximum size.

(8) **Interest to fisheries :** This paragraph gives an account of the areas where the species is fished and of the nature of the fishery; its importance is either qualitatively estimated (minor, moderate, major or potential) or actual figures of annual landings are provided. Data on utilization (fresh, dried, cooked, frozen, canned, etc.) also are given where available. Here, too, the quality and quantity of the available information vary considerably with the species.

(9) **Local species names:** These are the names used locally for the various species. The present compilation is necessarily incomplete, since only a fraction of the local names used throughout the world is actually published. In many cases, local names were available only for species supporting traditional fisheries. Apart from possible omissions due to limitations of literature available, some of the denominations included may be somewhat artificial (i.e. through transliteration of indigenous words into English). The local species denomination is preceeded by the name of the country concerned (in capital letters) and, where necessary, by geographical specifications (in lower case). Whenever possible, the language of the transcribed vernacular name is added in parenthesis. When more than one name is used within a country, the official name, if available, is underlined.

(10) **Literature :** This includes references to the most important publications relevant to the species, the emphasis being on biology and fisheries. Additional references are included in the bibliography. In the case of a few uncommon species, only systematic papers are available. Of particular importance to the present catalogue were the published works of W. Adam, T. Okutani, and G.L. Voss.

(11) **Remarks :** Important information concerning the species but not fitting in any of the previous categories is given here. For instance, in some cases the scientific name used in the present catalogue, although nomenclaturally correct, is not the best known. Other nomenclatural problems, such as the use of subspecies, are discussed.

1.2 General Remarks on Cephalopods

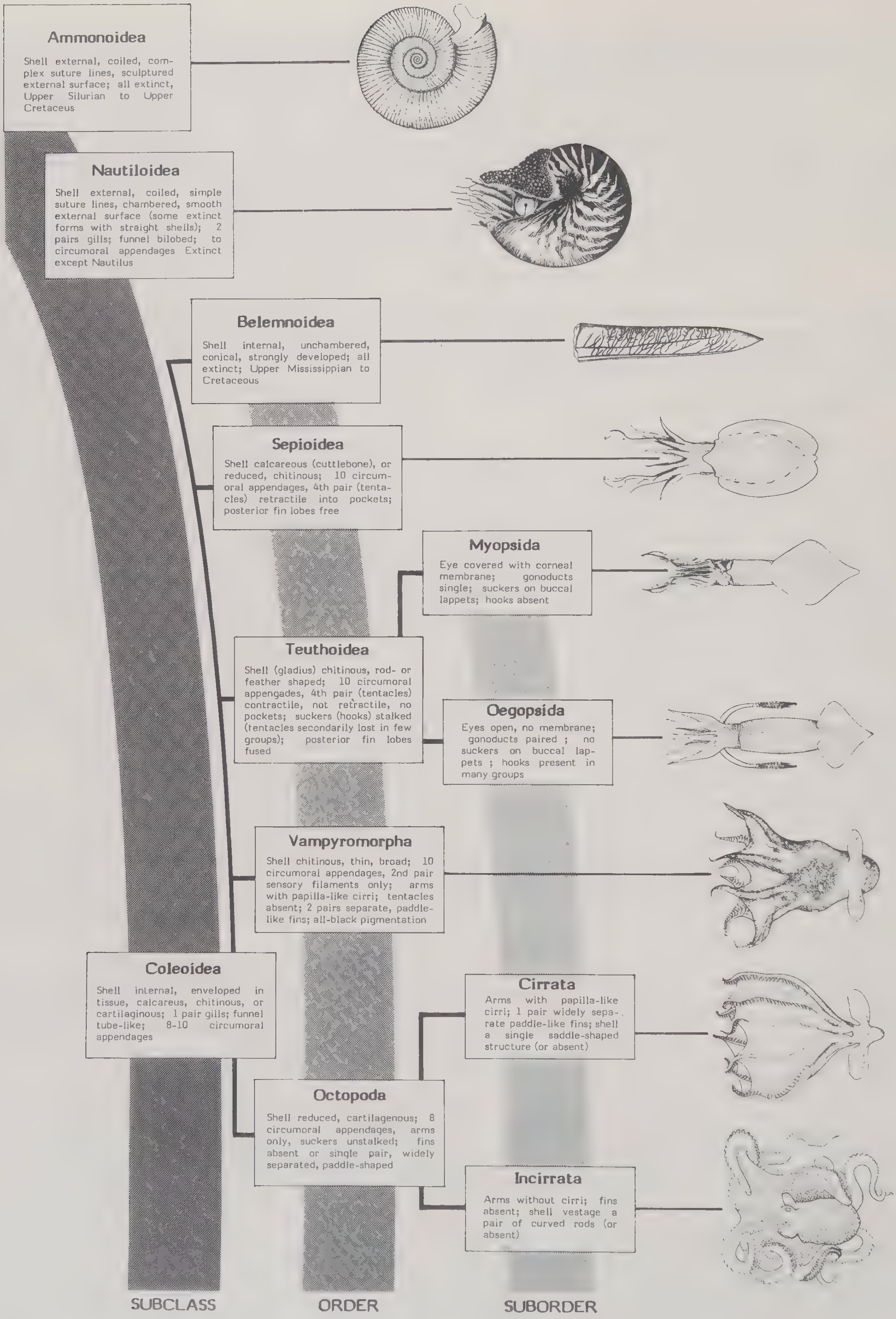
The group known as cephalopods (class Cephalopoda) consists of bilaterally symmetrical molluscs with a well developed head that contains a circumoral (surrounding the mouth) crown of mobile appendages that bear suckers and/or hooks (except in Nautilus). The mouth has chitinous beak-like jaws and a chitinous tongue-like radula (band of teeth). The shell is variously modified, reduced, or absent and is enveloped by the mantle; an external shell occurs only in the primitive form Nautilus (restricted to Indo-Pacific). Cephalopods are soft-bodied animals with their primary skeletal features a cranium and, in most forms, a mantle/fin support (cuttlebone or gladius). One pair of ctenidia (gills) is present (two pairs in Nautilus only). The central nervous system is highly developed, especially the well-organized eyes. A funnel or siphon (tube) expells water from the mantle (body) cavity providing propulsion and expelling waste products. Coloration is variable depending on group and habitat; most forms have numerous chromatophores (pigment sacs) and iridocytes (shiny, reflective platelets) in the skin, to accommodate rapid changes in colour and colour patterns that are an integral part of their behaviour.

The size of adults ranges from about 2 cm to 20 m in total length; largest specimens may weigh over 1 ton (average size of commercial species is 20 to 30 cm total length and 0.1 to 1 kg). Locomotion is achieved by drawing water into the mantle cavity followed by its jet-like expulsion through the funnel, and also by crawling along the bottom on the arms (mostly octopods, occasionally sepioids). Fins on the mantle provide stability, steering, and secondary locomotion. The sexes are separate; eggs are heavily yolked and development is direct, without metamorphic stages.

Cephalopods first evolved as a separate entity, the Nautiloids, in the Upper Cambrian period, 450 million years ago. Most species of the subclass Nautiloidea became extinct during the Jurassic, between about 180 and 150 million years ago and are largely replaced today by more recent forms, i.e. cuttlefishes, squids, octopuses and vampire squids, all belonging to the subclass Coleoidea. This subclass arose in the late Paleozoic (Upper Devonian to Carboniferous periods, about 400 to 330 million years ago, but most of its forms became extinct by the end of the Mesozoic, about 150 million years ago, and the only members of the subclass existing today are the forms that developed in the Upper Triassic and Lower Jurassic, which are placed in the four surviving orders. An overview of the subclasses, orders and suborders of cephalopods is given in Fig. 1.

The total number of living species of cephalopods is fewer than 1 000 distributed in 43 families. Cephalopods occur in all marine habitats of the world: benthic, cryptic, or burrowing on coral reefs, grass flats, sand, mud and rocks; epibenthic, pelagic and epipelagic in bays, seas, and the open ocean. The range of depths extends from the surface to over 5 000 m. Abundance of cephalopods varies (depending on group, habitat, and season) from isolated territorial individuals (primarily benthic octopods) through small schools with a few dozen individuals to huge schools of neritic and oceanic species with millions of specimens.

The four groups of cephalopods, squids, cuttlefishes, octopuses, and chambered nautiluses are easily distinguished by external characteristics. The squids have an elongate, torpedo-like body with posterolateral fins, and 8 circumoral arms, not connected at bases with a web, with 2 (occasionally more) rows of stalked suckers bearing chitinous rings (and/or hooks) running the entire length, plus 2 longer tentacles with an organized cluster (tentacular club) of 2 or more rows of suckers (and/or hooks) at the distal end. The cuttlefishes have broad sac-like bodies with lateral fins that either are narrow and extend the length of the mantle (Sepiidae) or are short, round and flap-like (Sepiolidae): in either case the posterior lobes of the fins are free (subterminal) and separated by the posterior end of the mantle; 10 circumoral appendages, the longest (4th) pair (= tentacles) retractile into pockets at the ventrolateral sides of head; the 8 remaining arms frequently with 4 rows of stalked suckers with chitinous rings, never hooks (otherwise 2 rows); eyes covered with a transparent membrane and eyelids present; shell thick, chalky, calcareous (cuttlebone of Sepia) or thin, chitinous (Sepiolidae). The octopuses have a short, sac-like body either with no lateral fins or with separate paddle-like fins in some deep-sea forms, and 8 circumoral arms only (no tentacles) with bases connected by a membraneous web and unstalked suckers, without chitinous rings, along the length of the arms. The chambered nautiluses are characterized by an external,



Ammonoidea

Shell external, coiled, complex suture lines, sculptured external surface; all extinct, Upper Silurian to Upper Cretaceus

Nautiloidea

Shell external, coiled, simple suture lines, chambered, smooth external surface (some extinct forms with straight shells); 2 pairs gills; funnel bilobed; to circumoral appendages Extinct except Nautilus

Belemnoidea

Shell internal, unchambered, conical, strongly developed; all extinct; Upper Mississippian to Cretaceous

Sepioidea

Shell calcareous (cuttlebone), or reduced, chitinous; 10 circumoral appendages, 4th pair (tentacles) retractile into pockets; posterior fin lobes free

Myopsida

Eye covered with corneal membrane; gonoducts single; suckers on buccal lappets; hooks absent

Teuthoidea

Shell (gladius) chitinous, rod- or feather shaped; 10 circumoral appengades, 4th pair (tentacles) contractile, not retractile, no pockets; suckers (hooks) stalked (tentacles secondarily lost in few groups); posterior fin lobes fused

Oegopsida

Eyes open, no membrane; gonoducts paired ; no suckers on buccal lappets ; hooks present in many groups

Vampyromorpha

Shell chitinous, thin, broad; 10 circumoral appendages, 2nd pair sensory filaments only; arms with papilla-like cirri; tentacles absent; 2 pairs separate, paddle-like fins; all-black pigmentation

Coleoidea

Shell internal, enveloped in tissue, calcareus, chitinous, or cartilaginous; 1 pair gills; funnel tube-like; 8-10 circumoral appendages

Cirrata

Arms with papilla-like cirri; 1 pair widely separate paddle-like fins; shell a single saddle-shaped structure (or absent)

Octopoda

Shell reduced, cartilagenous; 8 circumoral appendages, arms only, suckers unstalked; fins absent or single pair, widely separated, paddle-shaped

Incirrata

Arms without cirri; fins absent; shell vestage a pair of curved rods (or absent)

Fig. 1 Classification of cephalopods

smooth, coiled, chambered shell, 63 (males) to 94 (females) circumoral appendages without suckers, a "funnel" consisting of two flaps or lobes, simple eyes without lenses, and the absence of an ink sac. More detailed descriptions of these four groups are presented in the systematic section.

All cephalopods are dioecious (separate sexes) and many, though not all, exhibit external sexual dimorphism, either in structural or size differences. Females generally are larger than males. Males of many forms possess 1 or 2 modified arms (hectocotylus) for mating. The hectocotylus may consist of modified suckers, papillae, membranes, ridges and grooves, flaps, etc., but in any case it functions to transfer the spermatophores (sperm packets) from the male's mantle cavity to a locus of implantation on the female, which may occur inside the mantle cavity, around the mantle opening on the neck, in a pocket under the eye, around the mouth, etc. Fertilization takes place in the female as the eggs are laid. Eggs of squids generally are encased in a gelatinous matrix secreted by the nidamental glands and are laid as multi-finger-like masses (sometimes called "sea mops") attached to rocks, shells or other hard substrate on the bottom in shallow waters (inshore squids), or they are extruded as large, singular, sausage-shaped masses that drift in the open sea (oceanic squids). The fingers each may contain from a few to several hundred eggs, while the sausages contain tens or even hundreds of thousands of eggs. The mode of reproduction and egg-laying is unknown for many forms, especially oceanic and deep-sea species. Cuttlefishes lay relatively few, large grape-like eggs that are attached to hard substrates and are usually coloured black by a covering of ink deposited by the female at egg-laying. Benthic octopuses lay their eggs in great, grape-like clusters and strands in lairs, under rocks and in abandoned mollusc shells, where they brood them until they hatch. The eggs are attached to each other, but they are not encased in a gelatinous matrix. The female of the pelagic octopus Argonauta constructs a thin, shell-like egg case in which she resides and lays festoons of eggs, fertilization having taken place from sperm contained in the highly modified hectocotylus that was autotomized (detached) from the male and deposited in the egg case. The life expectancy of cephalopods is about one to two years in most forms, but larger species of squids and octopus, for example, the giant squid (Architeuthis spp.) and the giant octopus (O. dofleini), must live for several years. Many species die after spawning, but this phenomenon apparently is not universal.

Cephalopod eggs are very yolky and hence cleavage is incomplete, so that typical molluscan spiral cleavage is absent. Development is direct and the young hatch as miniatures of the adult (to a greater or lesser extent depending on the species). Thus, no discrete larval stages or metamorphoses occur. Cephalopod eggs may vary in size from about 1.7 cm long in some demersal Octopus species to 0.8 mm long in the pelagic Argonauta, both octopods. Eggs of Sepia can attain 9 or 10 mm in diameter. Time of embryonic development also varies widely, from a few weeks to several months, depending on the species and temperature conditions. Hatching may occur rapidly from a single clutch or be extended over a period of 2 or 3 weeks. At hatching, young animals often inhabit different habitats than the adults. For example, the young of some species of benthic octopuses spend periods of time as planktonic organisms before settling to their bottom habitat, and the "larvae" of many deep-sea forms occur in the upper 100 m of the open ocean, then exhibit an ontogenetic descent, gradually occurring at deeper depths with increasing size.

Many species of oceanic cephalopods undergo diel vertical migrations, wherein they occur at depths of about 400 to 800 m during the day, then ascend into the uppermost 200 m or so during the night. While shallow-living cephalopods are able to conceal themselves by chromatophore-produced colour patterns and chameleon-like colour changes, many deep-sea forms camouflage themselves by producing bioluminescent light from photophores (light-producing organs) which eliminates their silhouettes against the downwelling light in the dimly-lit mid-depths.

Cephalopods are active predators that prey upon shrimps, crabs, fishes, other cephalopods, and, in the case of octopuses, on bivalved molluscs. In turn, cephalopods are major food items in the diets of toothed whales, seals, pelagic birds (penguins, petrels, albatrosses, etc.), and both benthic and pelagic fishes (e.g., sea basses, lancetfishes, tunas, billfishes, sharks and rays).

The role of cephalopods in the ecosystem seems to be that of subdominant predators which tend to increase in biomass when other species (particularly their predators and competitors for food) become depleted as a result of heavy fishing. This has been observed, for example, in the sparid fishery off Sahara, the gadoid fishery in the northwest Atlantic and the trawl fishery in the Gulf of Thailand.

Catches of cephalopods have been steadily increasing in most parts of the world until 1982. In fact, world catches of squids and cuttlefishes increased by 57% and 84%, respectively, in the period from 1970 to 1980, compared to only 8% increase in total catches from the sea. The more traditional octopus fisheries, however, showed only a 2% increase for the same period, with a peak in 1974. Table 1 gives figures for the world catch of cephalopods for the period between 1975 and 1981 (FAO, 1983).

Cephalopod fisheries are unevenly distributed in the world's oceans. More than half of the total catch is taken in the northwest Pacific, the northeast and northwest Atlantic and the northeast Pacific, but a number of small scale fishing activities also exist in other areas. The reported catch of cephalopods totalled 1 304 000 metric tons in 1981, of which 71.8% was accounted for by neritic and oceanic squids (i.e., Todarodes, Loligo, Illex, etc.), 13.6% by cuttlefish (Sepia, Sepiella and allied genera) and about 14.6% by octopuses (mainly Octopus and Eledone). Most of this catch (around 700 000 metric tons) was taken by Japanese vessels throughout the world.

TABLE 1

World catch (in metric tons) of cephalopods by statistical categories for the period between 1975 and 1981

(Source: FAO, 1983)

	1975	1976	1977	1978	1979	1980	1981
Sepia officinalis	12 253	11 140	10 886	8 595	9 350	14 028	12 855
Other Sepioidea	137 633F	163 506F	185 083F	192 547F	198 663F	174 729F	165 248F
Sepioidea	(12.7%) 149 886	(14.4%) 174 646	(15.9%) 195 969	(15.1%) 201 142	(13.7%) 208 013	(12.3%) 188 757	(13.6%) 178 103
Loligo pealei	24 621	21 311	16 470	10 725	17 401	23 612	10 602
Loligo spp.	113 171	92 859	105 379	119 217	106 149	104 375F	108 457F
Illex illecebrosus	34 223	68 321	104 215	88 236	179 361	88 660	39 076F
Illex argentinus	4 620	8 266	2 348	61 847	92 252	9 827	13 723
Dosidicus gigas	365	897	658	2 709	11 144	19 069	9 695
Todarodes sagittatus	4 399	4 683	4 307	3 474	5 270	5 864	12 971
Todarodes pacificus	398 660	325 740	225 932	234 344	238 978	378 954	228 355
Nototodarus sloani	18 786	19 692	27 149	27 480	28 301	62 983	30 970
Unidentified Loliginidae and Ommastrephidae	204 052F	284 688F	358 652F	391 582F	482 974F	475 964F	482 073F
Loliginidae, Ommastrephidae	(67.9%) 802 897	(68.3%) 826 457	(68.6%) 845 110	(70.6%) 939 614	(76.3%) 1 161 830	(76.4%) 1 169 308	(71.8%) 935 922
Octopus vulgaris	38 977	40 014	42 772	32 659	25 612	17 113	24 361
Eledone spp.	2 612	2 497	2 369	3 134	2 375	2 070	2 299
Other Octopodidae	188 144F	166 888F	145 278F	153 757F	123 803F	153 181F	163 469F
Octopodidae	(19.4%) 229 733	(17.3%) 209 399	(15.5%) 190 419	(14.3%) 189 550	(10.0%) 151 790	(11.3%) 172 364	(14.6%) 190 129
Total Cephalopoda	1 182 516	1 210 502	1 231 498	1 330 306	1 521 633	1 530 429	1 304 154

F = FAO estimate

The principal types of fishing methods and gear utilized in cephalopod fisheries are the following:

- Cuttlefishes are taken mainly as a bycatch in trawl fisheries for finfishes, even though more specialized small-scale fisheries operating with trawls, dredges, seines, jigs and pots, have developed for these species in certain regions (i.e., Mediterranean).

- Coastal squids are caught mainly with otter trawls, pair trawls (Southeast Asia), purse seines and by night-light fishing methods (especially in the spawning season when the squids aggregate in inshore waters); they also are taken as bycatch in fin and shrimp fisheries. Oceanic squids are captured primarily by jigs (often jigging machines); gillnets are effective on some species.

- Octopuses are taken by bottom trawls, pots, dragnets, hooks and spears.

The utilization of cephalopods is manyfold, ranging from fresh consumption (eaten raw as "sashimi" in Japan) to various types of processing (dried, canned, frozen, reduced to fishmeal, etc.). Their high protein and low fat content make cephalopods an important element in the diet of human populations.

1.3 Illustrated Glossary of Technical Terms and Measurements

Measurements Used

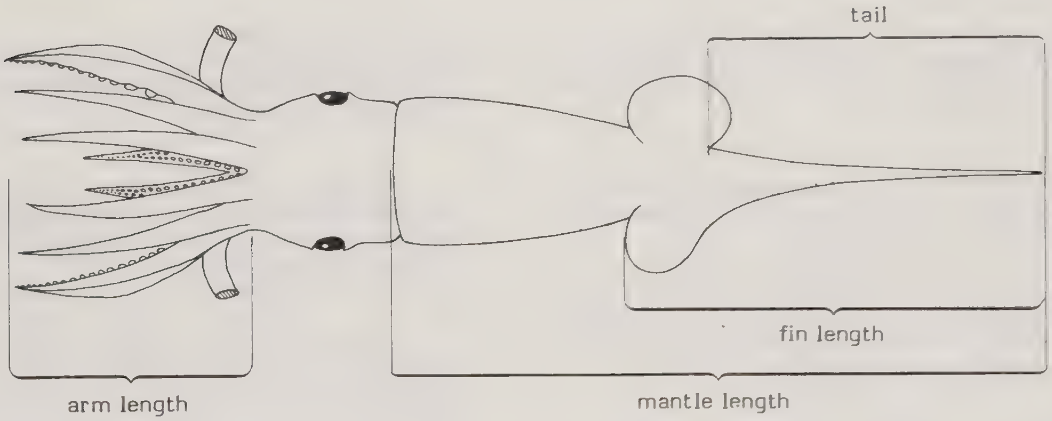


Fig. 2 Schematic illustration of a squid showing measurements for squids and cuttlefishes

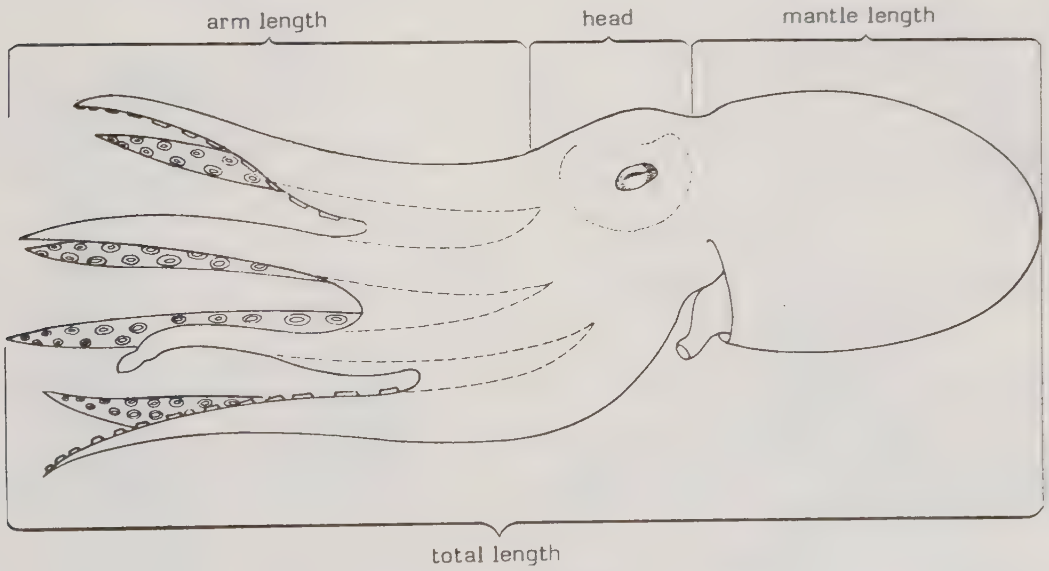


Fig. 3 Schematic illustration of an octopus

Glossary of Technical Terms

Anal flaps - A pair of fleshy papillae that arise at the sides of the anus (Fig. 4).

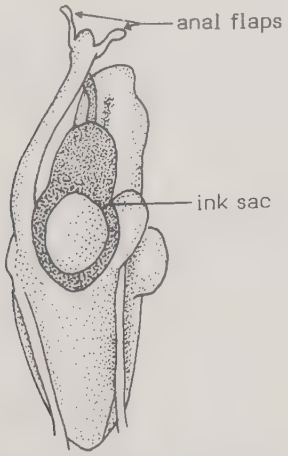

anal flaps
ink sac

Fig. 4

Anterior - Toward the head-end or toward the arm-tips of cephalopods.

Arm formula - Comparative length of the arms expressed numerically in decreasing order, e.g., 3.4.2.1 or 3.2.4.1.

Armature - Refers to the presence and arrangement of suckers and/or hooks on the arms and tentacular clubs of cephalopods.

Buccal lappet - Small, subtriangular flap at tip of muscular band that supports the buccal membrane; may bear suckers (Fig. 5).

Buccal membrane - Thin web of tissue that encircles the mouth, reinforced by 6 to 8 buccal supports (Fig. 5).

Buccal membrane connectives - Muscular bands that connect the supports of the buccal membrane to the bases of the arms (Fig. 5)

Buccal suckers - Small suckers on the buccal lappets/membrane (Fig. 5)

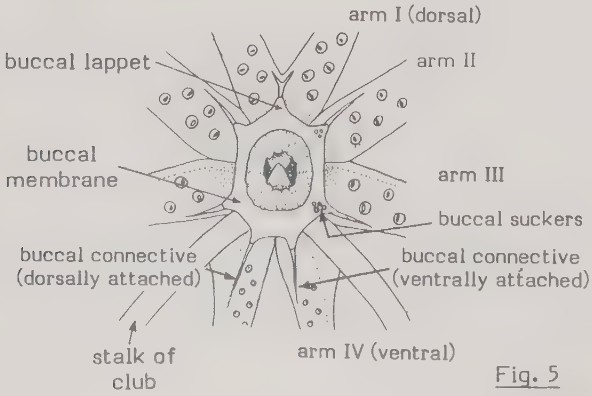

arm I (dorsal)
buccal lappet
arm II
buccal membrane
arm III
buccal suckers
buccal connective (dorsally attached)
buccal connective (ventrally attached)
stalk of club
arm IV (ventral)

Fig. 5

Calcified - Chalky, calcareous by deposition of calcium salts (calcium carbonate).

Calimus - The conical papilla or projection on the hectocotylus of octopods at the proximal terminus of the sperm groove, distal to the last sucker (Fig. 6) (see Ligula).

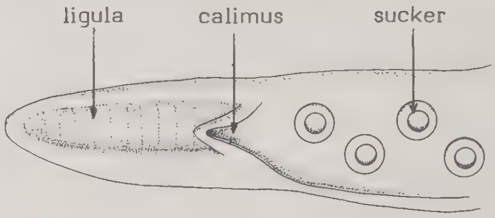

ligula
calimus
sucker

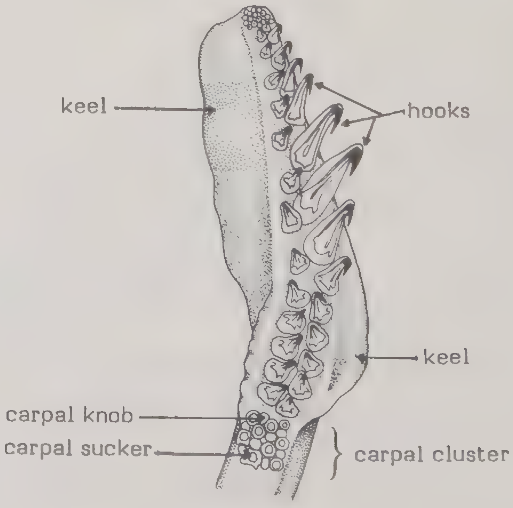
Fig. 6

Carpal cluster (Carpal pad) - A usually distinct group of suckers and knobs on the carpus of the tentacular club (Fig. 7).

Carpal knobs - Small, rounded, hemispherical protuberances on the carpus to which carpal suckers from the opposite club adhere during the locking of the clubs (Fig. 7).

Carpal suckers - Small suckers on the carpus of the club that usually adhere to knobs on the opposite carpus during the locking of the clubs (Fig. 7).

Carpus - The proximal zone of (small) suckers (and knobs) on the tentacular club (Fig. 7).


keel
hooks
keel
carpal knob
carpal sucker
carpal cluster

tentacular club Fig. 7

Cartilaginous scales - Cartilage-like structures in the skin of certain squids; may be overlapping and scale-like, or multifaceted knobs or papillae (Fig. 8).

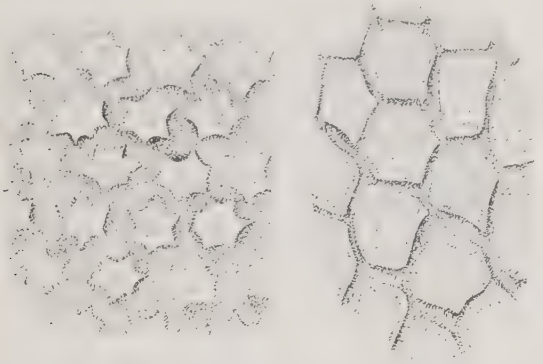


Fig. 8

Chitin(ous) - A horny polysaccharide substance (fingernail-like) that forms the sucker rings, hooks and beaks.

Chromatophores - Pigment-filled muscular sacs in the skin under individual nervous control that collectively provide the background colour, colour patterns, and colour play of cephalopods.

Circumoral appendages - The eight arms (squids, cuttlefishes and octopuses) and two tentacles (squids and cuttlefishes) or the very numerous arms (Nautilus) that arise from the head and encircle the mouth of cephalopods (Fig. 5).

Cirri - Arm: elongate, fleshy, finger-like papillae along the lateral edges of the oral surface of the arms, especially in cirrate octopods (Fig. 9).

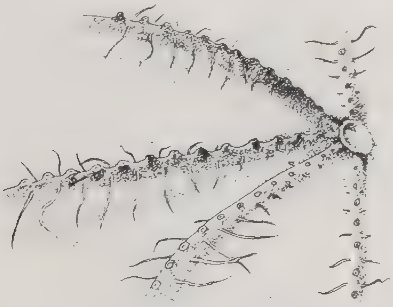


Fig. 9

Body: fleshy protuberances of the skin that can be erected as papillae, usually over the eyes (Fig. 10).

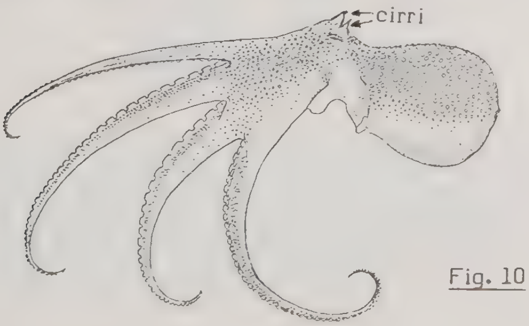
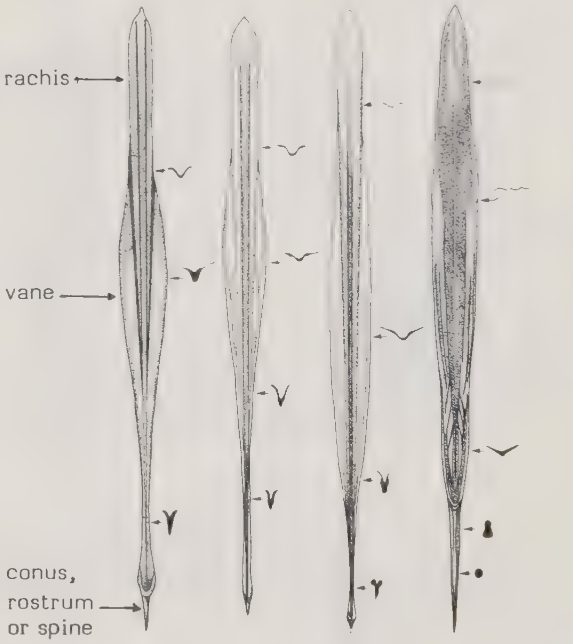


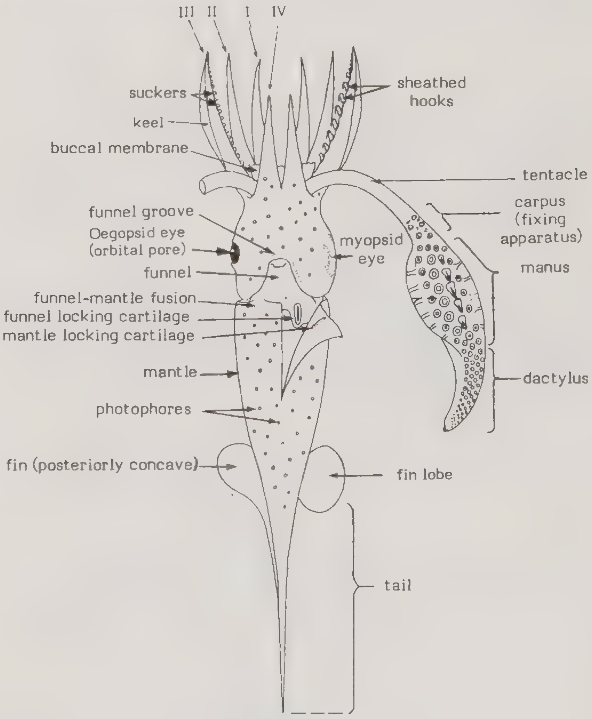
Fig. 10

Cones, conus - The spoon-like or cup-like conical posterior terminus of the gladius or cuttlebone; homologous to the phragmacone of fossil teuthoids (Fig. 11).


rachis
vane
conus,
rostrum
or spine

gladiuses Fig. 11

Corneal membrane - The very thin, transparent skin that covers the eyes of myopsid and sepioid cephalopods (Fig. 12).

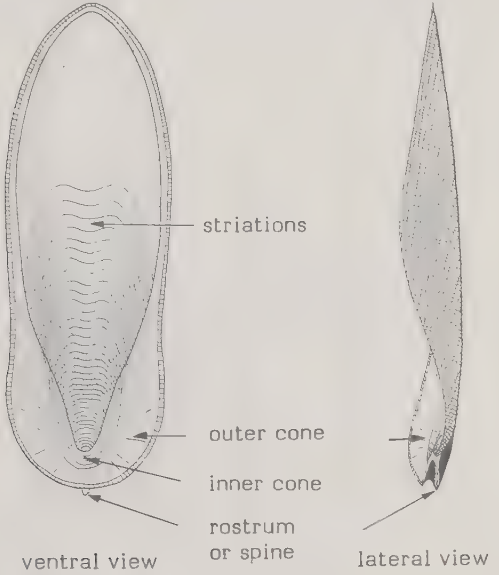

III
II
I
IV
suckers
keel
buccal membrane
sheathed hooks
tentacle
carpus (fixing apparatus)
funnel groove
Oegopsid eye (orbital pore)
myopsid eye
funnel
manus
funnel-mantle fusion
funnel locking cartilage
mantle locking cartilage
mantle
dactylus
photophores
fin (posteriorly concave)
fin lobe
tail

a composite diagram illustrating
basic squid (teuthoid) features

ventral view

Fig. 12

Cuttlebone - The calcareous (chalky) oblong, supporting plate in the dorsal part of the mantle of cuttlefishes (see Sepion) (Fig. 13).

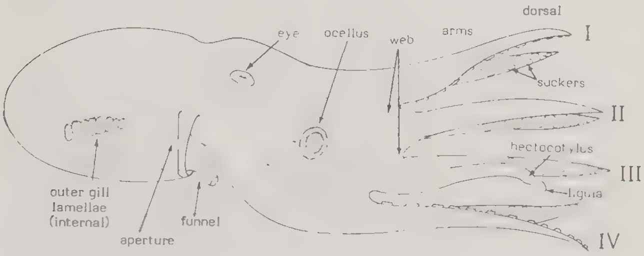

striations
outer cone
inner cone
rostrum or spine
ventral view
lateral view

cuttlebone Fig. 13

Dactylus - The distal, terminal section of the tentacular club, often characterized by suckers of reduced size (Fig. 12).

Distal - Away from the body or point of origin; toward the peripheral parts (opposite of proximal).

Dorsal - The uppermost or back surface of a cephalopod, opposite the ventral surface where the funnel is located (Fig. 14).


dorsal
eye
ocellus
web
arms
I
suckers
II
hectocotylus
III
ligula
IV
outer gill lamellae (internal)
funnel
aperture

schematic lateral view of octopus features Fig. 14

Fin angle - The angle between the longitudinal axis of the mantle and the posterior border of one fin (Fig. 15).

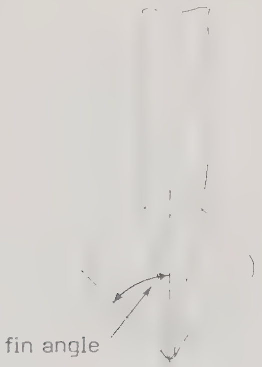


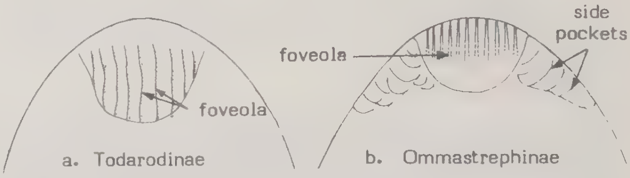
Fig. 15

Fin lobe - The portion of each fin that protrudes anteriorly from the anterior point of attachment of the fin to the mantle (Fig. 12).

Fins - The pair of muscular flaps that arise along the dorsolateral surface of the mantle of sepioids, teuthoids, and cirrate octopods; used for locomotion, steering and stabilization (Fig. 12).

Fixing apparatus - The mechanism of suckers and knobs on the carpal region of the tentacular club that permits the two clubs to be locked together during capture of prey (Fig. 7) (see Carpus).

Foveola - Transverse, membranous fold of skin that forms a pocket in the funnel groove of some oegopsids (Fig. 16) (see Side pockets).

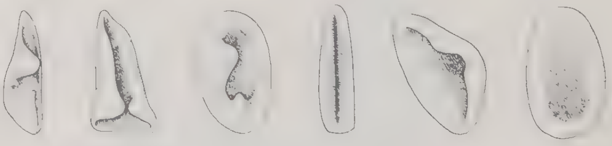

foveola
a. Todarodinae
foveola
side pockets
b. Ommastrephinae

funnel groove Fig. 16

Funnel - The ventral, subconical tube through which water is expelled from the mantle cavity during locomotion and respiration (reproductive and waste products and the ink also pass through the funnel) (Figs 12, 14). Archaic term - siphon.

Funnel groove - The depression in the posteroventral surface of the head in which lies the anterior portion of the funnel (Fig. 16).

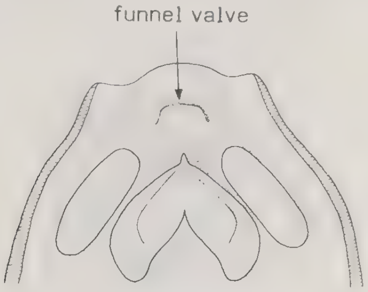
Funnel locking-cartilage - The cartilaginous groove, pit, pocket, on depression on each ventrolateral side of the posterior part of the funnel that joins with the mantle component to lock the funnel and mantle together during locomotion, so water is expelled only through the funnel and not around the mantle opening (Figs 12, 17) (see Mantle locking-cartilage).



funnel locking-cartilage Fig. 17

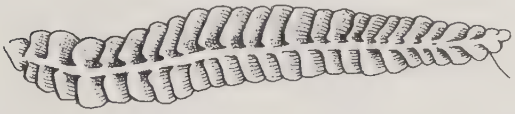
Funnel organ - The glandular structure fused to the internal surface of the funnel, generally a single W-shaped form in octopods and a dorsal inverted V-shaped component with opposed ventral oblong components in decapods (Fig. 18).

Funnel valve - The semilunar muscular flap in the dorsal surface of the distal opening of the funnel (Fig. 18).



funnel organ Fig. 18

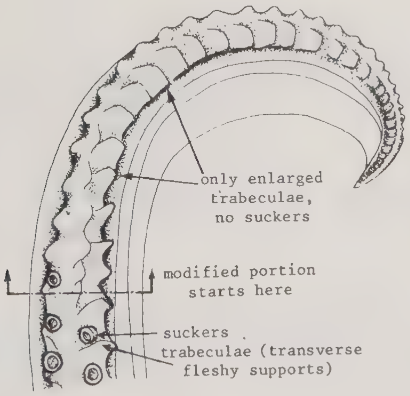
Gill lamellae - The leaf-like convoluted individual components of the gill through which gas exchange occurs (Figs 19, 22).



gill lamella Fig. 19

Gladius - The feather or rod-shaped chitinous supporting structure in the dorsal midline of teuthoids and non-sepiid sepioids; the homolog of the shell of ancestral forms (Fig. 11) (= **Pen**).

Hectocotylus - One (or more) arm(s) of male cephalopods modified for transferring spermatophores to the female; modifications may involve suckers, sucker stalks, protective membranes, trabeculae (Figs 6, 20) (see Calimus, Ligula).


only enlarged trabeculae, no suckers
modified portion starts here
suckers
trabeculae (transverse fleshy supports)

hectocotylized arm *(Illex oxygonius)* Fig. 20

Hooks - Chitinous, claw-like structures ontogenetically derived from the suckers on the arms and/or clubs of some oegopsids (Fig. 7).

Ink sac - The structure that manufactures and stores the ink of cephalopods; it lies along the intestine and empties via a duct into the rectum (Fig. 4).

Keel - **(1)** A flattened, muscular extension along the aboral surface of some arms to render them more hydrodynamic (Fig. 12); **(2)** 1 or 2 expanded muscular membranes on the tentacular club of some groups (Fig. 7).

Lateral - Pertaining to the side(s) of an organism or structure, away from the centre or midline.

Light organ - A simple or complex structure that produces bioluminescence by intrinsic (self-generated) or extrinsic (bacterial) means (also termed **photophore**) (Figs 12, 21).

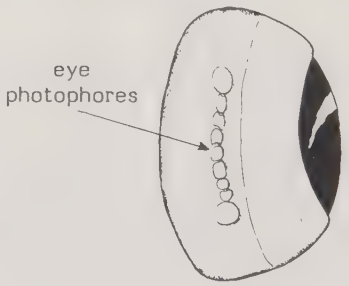


Fig. 21

Ligula - The spatulate to spoon-shaped, terminal structure of the hectocotylus of octopods, that contains the calimus basally (proximally) and usually a series of transverse ridges and grooves on the oral surface (Fig. 6) (see Calimus, Hectocotylus).

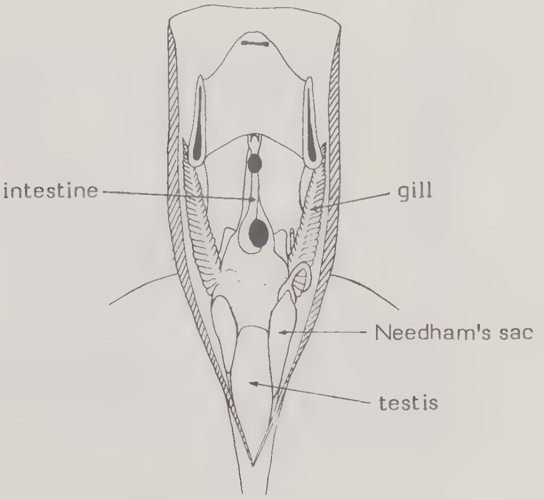
Mantle - The fleshy (muscular) tubular or sac-like body of cephalopods; provides propulsion through jet-like expulsion of water; contains the viscera (Figs 12, 14).

Mantle locking-cartilage - The cartilaginous ridge, knob or swelling on each side of the ventrolateral, internal surface of mantle that locks into the funnel component of the apparatus during locomotion (Figs 12, 18) (see Funnel locking-cartilage).

Manus - Central or "hand" portion of club between the dactylus distally and the carpus proximally (Fig. 12).

Medial(n) - Pertaining to a structure located towards, on, or along the midline.

Needham's sac - The elongate, membraneous container at the terminus of the male reproductive tract that stores completed spermatophores (Fig. 22) (= **spermatophore sac**).



schematic internal view of anterior ventral mantle Fig. 22

Ocellus - A pigmented spot or patch usually consisting of a central locus of concentrated chromatophores with one or more concentric rings of chromatophores. Ocellae occur on some octopuses, and their normally vivid pigmentation make them stand out against the background colouration (Fig. 14).

Olfactory papilla - A bump-like to finger-like protuberance on the posterolateral surface of each side of the head; of presumed olfactory function.

Orbital pore - Minute pore in the anterior part of the transparent tissue that covers the eyes of sepioids and myopsids (see Orbital sinus) (Fig. 12).

Orbital sinus - An anteriorly directed indentation in the eyelid of oegopsids (Fig. 23) (see Orbital pore).

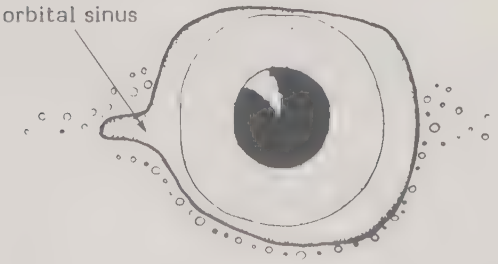
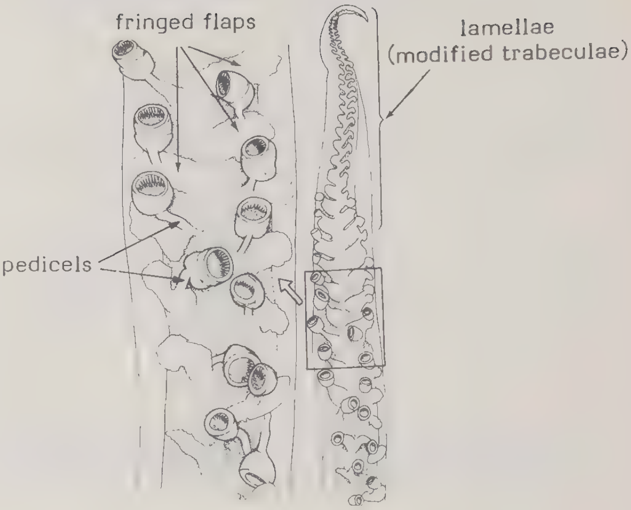


Fig. 23

Pedicel - A short, tubular stalk that supports a sucker in sepioids and teuthoids (Fig. 24).

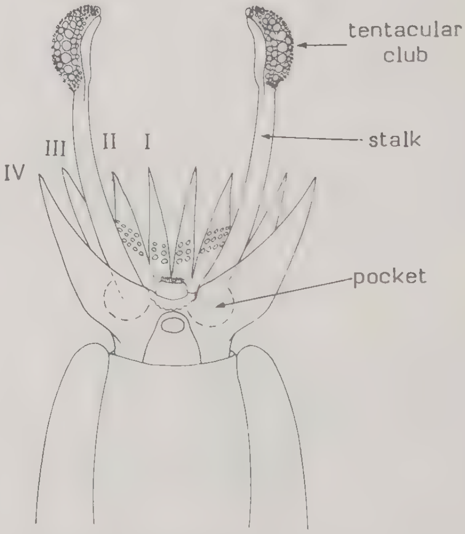


hectocotylized arm in males Fig. 24

Pen - See gladius.

Photophore - An organ of greater or lesser complexity that produces and distributes bioluminescence, either intrinsically through biochemical reaction or extrinsically through luminescent bacteria (Figs 12, 21) (see Light organ).

Pocket - An open depression in the anteroventral surface of the head of sepioids into which the feeding tentacles are retracted when not in use (Fig. 25).



ventral view partial diagrammatic of cuttlefish features Fig. 25

Posterior - Toward the tail-end of cephalopods.

Protective membrane - Thin web-like integument along the lateral angles of the oral surface of the arms and clubs lateral to the suckers, supported by muscular rods called trabeculae (Fig. 26) (see Trabeculae).

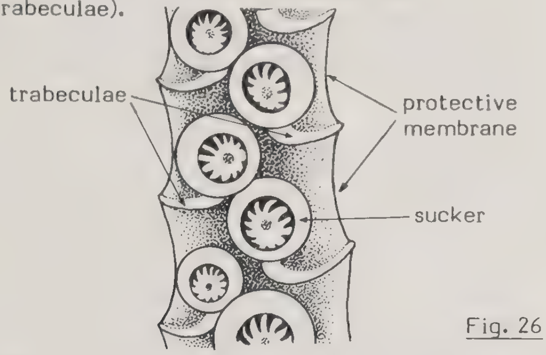


Fig. 26

Proximal - Toward the body or nearest or next to the point of origin or attachment; (opposite of distal).

Rachis - The thickened central axis that usually extends the entire length of the gladius. Free rachis is the portion that does not support vanes (Fig. 11) (see Gladius, Vane).

Radula - The chitinous, ribbon-like band in the mouth of cephalopods containing several transverse rows of teeth (Fig. 27).

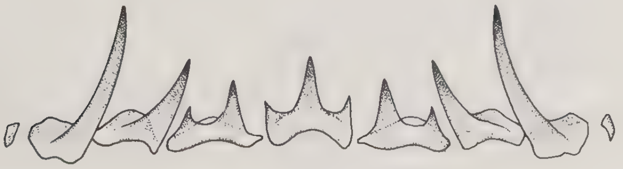


Fig. 27

Rostrum - A spike-like posterior extension of the gladius or cuttlebone, exterior to the conus (Figs 11, 13) (see Spine).

Secondary web - The narrow membrane that connects the primary web to the arms in some cirrate octopods; e.g., Cirroteuthidae.

Sepion - The calcareous dorsal supporting structure in the mantle of cuttlefishes (Fig. 13) (= **cuttlebone**).

Side pockets - Small membranous folds of the integument that form pockets lateral to the foveola (Fig. 16) (see Foveola).

Sperm recepticle - A bulbous structure in the buccal region of some female cephalopods, e.g., loliginids, for the retention of viable sperm until they are required for fertilization.

Spermatophore - A tubular structure manufactured by male cephalopods for packaging sperm; capable of holding millions of sperm, being transferred intact, and attaching to the female until fertilization begins (Fig. 28).

Fig. 28

Spermatophore pad - A fleshy patch of tissue, usually in the mantle cavity of some female cephalopods (e.g. loliginids), to which spermatophores adhere after mating until fertilization occurs.

Spine - The sharp spike-like extension on the posterior tip of the gladius or cuttlebone (Fig. 13) (see Rostrum).

Suckers - Muscular, suction-cup structures on the arms and tentacles (rarely on the buccal membrane) of cephalopods; some are stalked, placed on muscular rods that contract (squids and cuttlefishes); some are sessile, embedded without stalks on the oral surface of the arms (octopuses) (Fig. 29a). They are usually counted either in longitudinal or in transverse (oblique) rows (Fig. 29b).

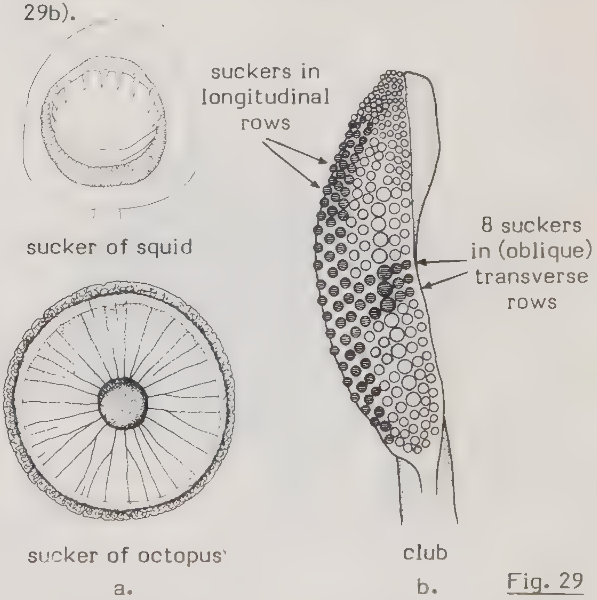

suckers in longitudinal rows
sucker of squid
8 suckers in (oblique) transverse rows
sucker of octopus
club
a.
b.

Fig. 29

Sucker ring - Chitinous, often serrated or denticulate ring that encircles the opening of suckers of squids and cuttlefishes (Fig. 31).

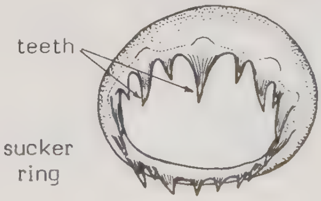


Fig. 30

Swimming membrane (keel) - An elongate, muscular vane along the aboral surface of arms of cephalopods that functions to streamline and support the arms during swimming (Figs 7, 12).

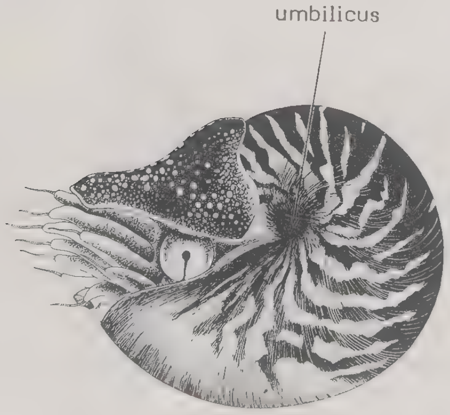
Tail - The posterior extension of the mantle, frequently elongate. Fins or tapered terminations of fins may extend posteriorly along the tail (Fig. 12).

Tentacles - Elongate, stalked circumoral appendages of cuttlefishes and squids used for prey-capture; distal ends contain clubs with suckers (or hooks); stalks usually devoid of suckers. Tentacles can retract into pockets on the head of cuttlefishes, or merely contract, in squids (Figs. 12, 25).

Tentacular club - Terminal portion of a tentacle; armed with suckers (or suckers and/or hooks), used for capturing prey (Figs 7, 12, 25).

Trabeculae - Muscular rods that support the protective membranes on the arms and clubs of cephalopods; occasionally membranes are reduced and/or trabeculae are elongated, so they extend beyond the edge of the membrane, papilla-like (Fig. 26).

Umbilicus - The central core of the chambered Nautilus shell, representing the juvenile shell with its initial coils (Fig. 31).



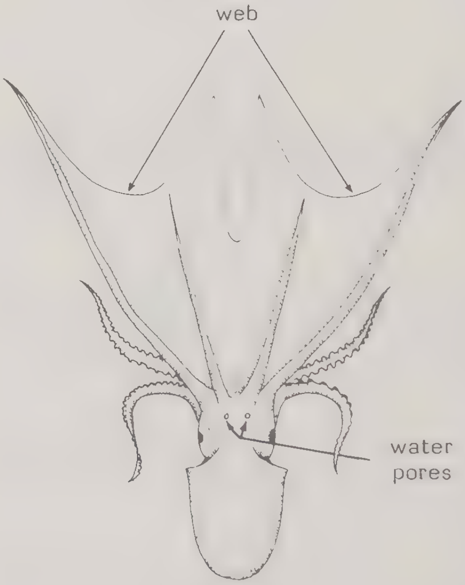
lateral view Fig. 31

Vane - Thin lateral expansion of the gladius that arises from the rachis (Fig. 11) (see Rachis).

Ventral - The lowermost or belly surface of a cephalopod; the surface on which the funnel is located; opposite the dorsal surface (Figs 12, 14).

Water pores - Small orifaces at base of the web of some pelagic octopuses, e.g., Tremoctopus (Fig. 32).

Web - A membranous sheet of greater or lesser extent that extends between the arms of many octopuses, giving an umbrella-like appearance when the arms are spread out, e.g., on cirroteuthids (Figs 14, or 32).



dorsal view Fig. 32

1.4 Key to Orders and Families

1a. More than 8 circumoral appendages

- 2a. More than 10 (63 to 94) circumoral appendages; suckers absent; chambered, coiled external shell (Fig. 33) .... **Order Nautiloidea** (monotypic order) **Family Nautilidae**

- 2b. Ten circumoral appendages (8 arms, 2 tentacles; tentacles may be ontogenetically lost); suckers (or hooks) mounted on stalks, with chitinous supporting rings; no external shell

  - 3a. Internal shell either straight and laminate, coiled and chambered, or rudimentary and straight; tentacles contractile and retractile into pockets between arms III & IV .... **Order Sepioidea**

    - 4a. Internal shell calcified

      - 5a. Internal shell coiled, chambered (Fig. 34) .... **Family Spirulidae**

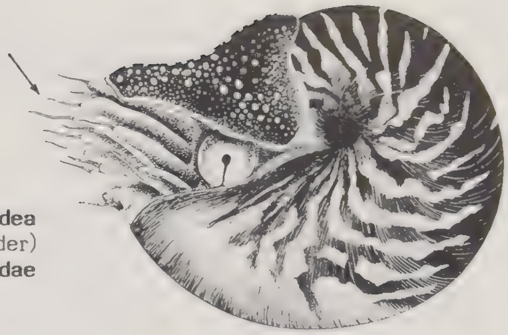
      - 5b. Internal shell straight, laminate, chalky (Fig. 35) ..... **Family Sepiidae**

    - 4b. Internal shell chitinous or lacking

      - 6a. Shell (gladius) present (except Euprymna), chitinous; one only or both dorsal arms or one dorsolateral arm hectocotylized (Fig. 36) ..... **Family Sepiolidae**

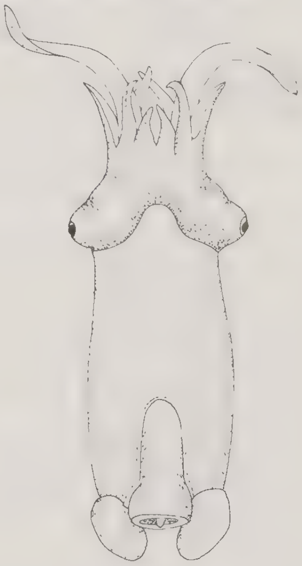
      - 6b. Shell (gladius) absent; left only or both ventral arms hectocotylized

        - 7a. Left ventral arm hectocotylized; dorsal border of mantle fused with head (Fig. 37) ... **Family Sepiadariidae**

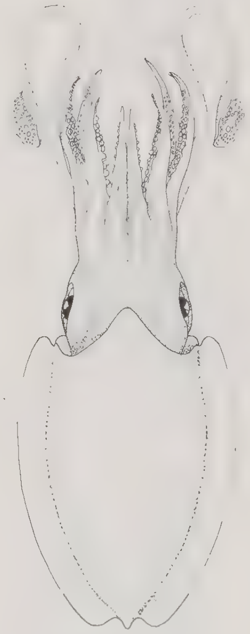


lateral view

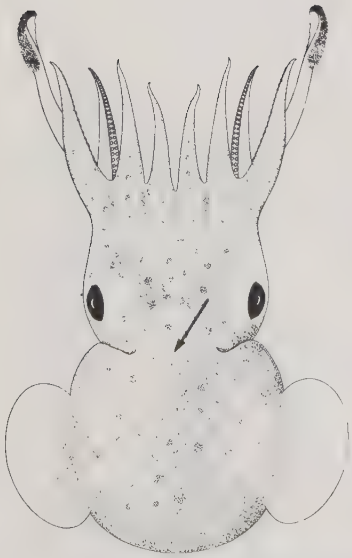
Nautilidae (Nautilus) Fig. 33



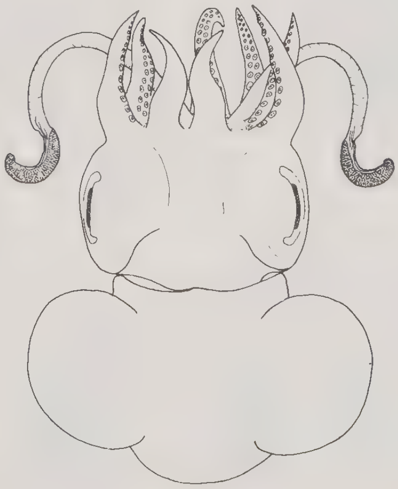
dorsal view
Spirulidae
(Spirula) Fig. 34



dorsal view
Sepiidae
(Sepia) Fig. 35



dorsal view
Sepiadariidae (Sepiadarium) Fig. 37



dorsal view
Sepiolidae (Rossia) Fig. 36

7b. Both ventral arms hectocotylized; dorsal border of mantle free (unfused) from head (Fig. 38) .... **Family Idiosepiidae**

3b. Internal shell straight, feather- or rod-shaped; tentacles contractile, not retractile, no pockets.. **Order Teuthoidea**

8a. Eye covered by transparent membrane (cornea) (Fig. 39a) .... **Suborder Myopsida**

9a. Four rows of suckers on manus of tentacular clubs; medial posterior border of fins concave (Fig. 40) .... **Family Loliginidae**

9b. Two rows of suckers on manus of tentacular clubs; medial posterior borders of fins convex (Fig. 41).. **Family Pickfordiateuthidae**

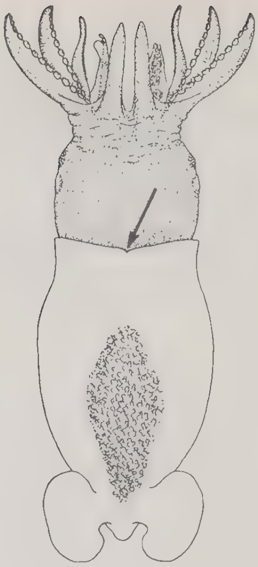
8b. Eye without cornea and in open contact with seawater (Fig. 39b) .... **Suborder Oegopsida**

10a. Funnel free from mantle; funnel-mantle locking apparatus present

11a. Funnel-locking apparatus a simple, straight groove and ridge (Fig. 42a)

12a. Arms with hooks or with suckers in 4 rows on proximal half of ventral arms

13a. Armature (suckers, hooks) of arms in 2 rows



dorsal view
Idiosepiidae (Idiosepius) Fig. 38

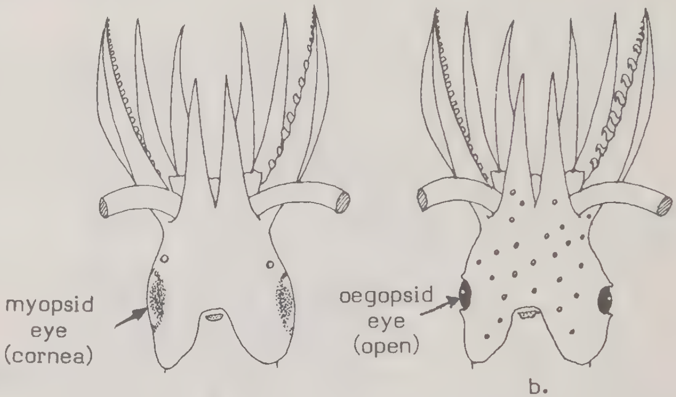
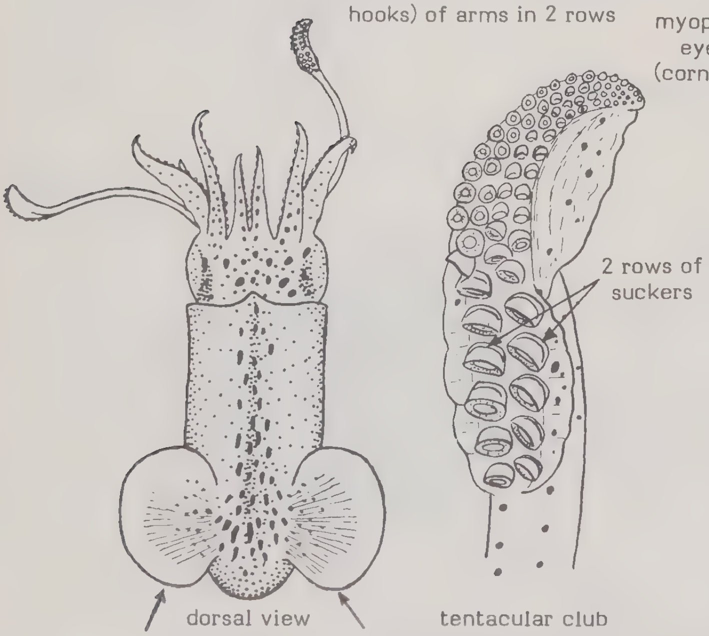

myopsid eye (cornea)
oegopsid eye (open)
a.
b.

Fig. 39


2 rows of suckers
dorsal view
tentacular club

Pickfordiateuthidae (Pickfordiateuthis) Fig. 41

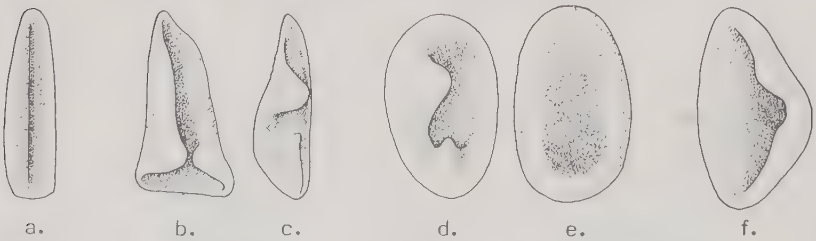
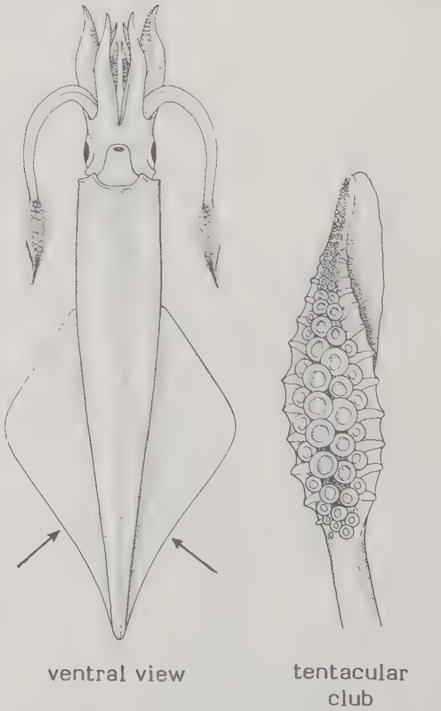


Fig. 42


ventral view
tentacular club

Loliginidae (Loligo) Fig. 40

14a. Tentacles present; fully developed clubs present (Fig. 43) .... **Family Enoploteuthidae**

14b. Tentacles and clubs absent in adults although present in larvae or occasionally in juveniles (Taningia) but always with rudimentary clubs (Fig. 44) .... **Family Octopoteuthidae**

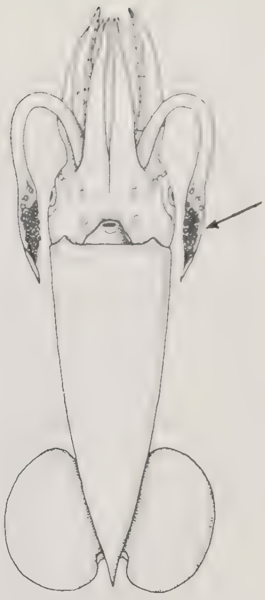
13b. Armature of arms in 4 rows (Fig. 45) .... **Family Gonatidae**

12b. Arms without hooks and with suckers in 2 rows on proximal half of ventral arms

15a. Buccal membrane connectives attach to ventral sides of arms IV (Fig. 46a)

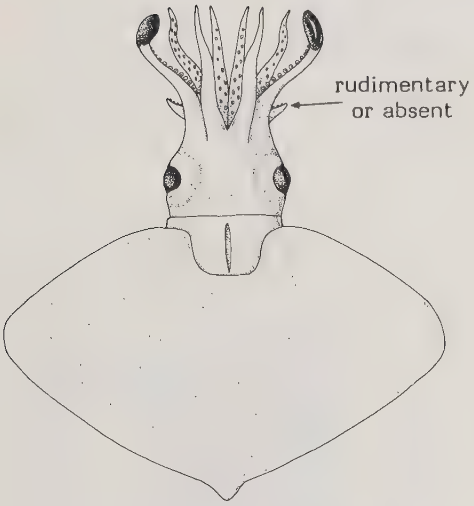
16a. Hooks present on tentacular clubs (Fig. 47a) (tentacles and clubs unknown in Chaunoteuthis) (Fig. 47b) .... **Family Onychoteuthidae**

16b. Hooks lacking on tentacular clubs



ventral view

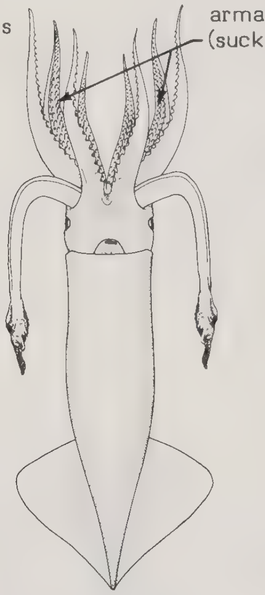
Enoploteuthidae (Pterygioteuthis) Fig. 43


rudimentary or absent

dorsal view

Octopoteuthidae (Taningia)

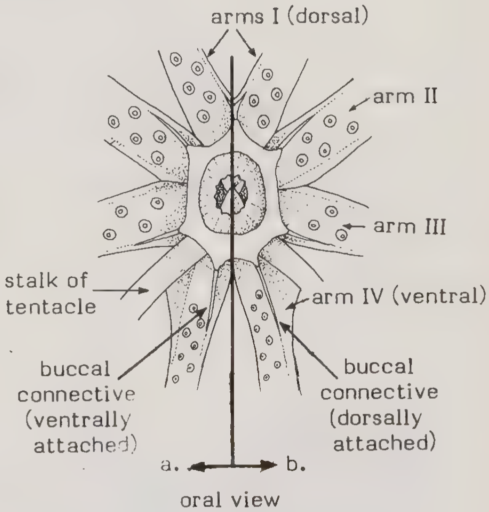
Fig. 44


armature elements (suckers and hooks) in 4 rows

ventral view

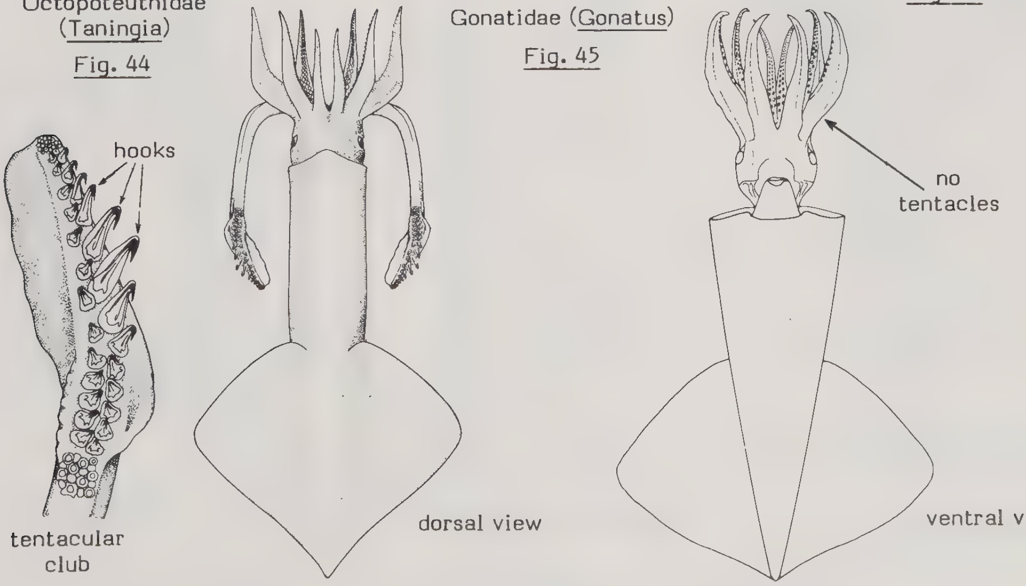
Gonatidae (Gonatus)

Fig. 45


arms I (dorsal)
arm II
arm III
stalk of tentacle
arm IV (ventral)
buccal connective (ventrally attached)
buccal connective (dorsally attached)
a.
b.

oral view

Fig. 46


hooks
tentacular club
dorsal view
no tentacles
ventral view

a. Onychoteuthis

b. Chaunoteuthis

Onychoteuthidae

Fig. 47

17a. Cartilaginous scales present on mantle (may be minute); tentacular clubs with 4 longitudinal rows of suckers (Fig. 48) .... **Family Lepidoteuthidae**

17b. Cartilaginous scales lacking; tentacular clubs with more than 4 longitudinal rows of suckers on some areas

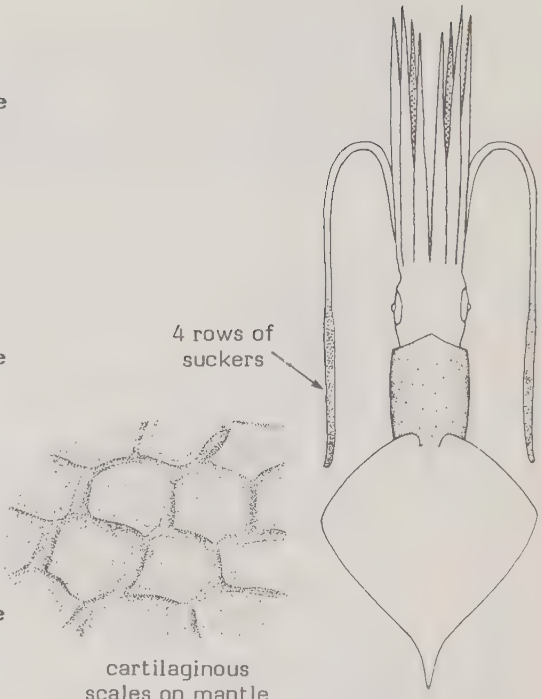
18a. Fins nearly as long as mantle, supported by strong, transverse, muscular ribs; minute suckers present on oral surface of buccal lappets (Fig. 49) .... **Family Ctenopterygidae**

18b. Fins less than half the body length and without supporting ribs; no suckers on buccal lappets

19a. Tentacular clubs with 6 uniform rows of suckers; a long, spike-like tail present (greater than fin length) (Fig. 50) .... **Family Batoteuthidae**

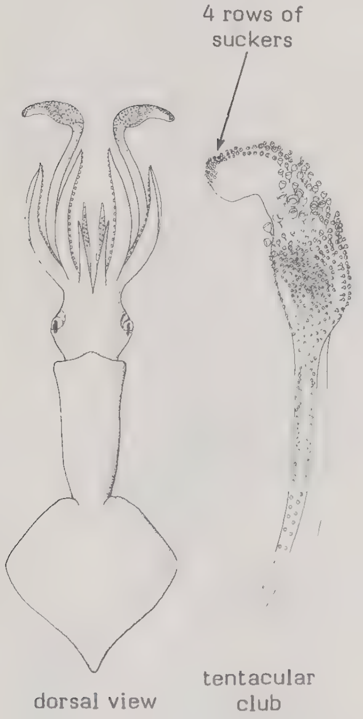
19b. Tentacular clubs with 4 rows of suckers on distal portion, numerous rows on proximal portion; no long, spike-like tail (Fig. 51) .... **Family Brachioteuthidae**

15b. Buccal membrane connectives attach to dorsal sides of arms IV (Fig. 46b)


4 rows of suckers
cartilaginous scales on mantle
dorsal view

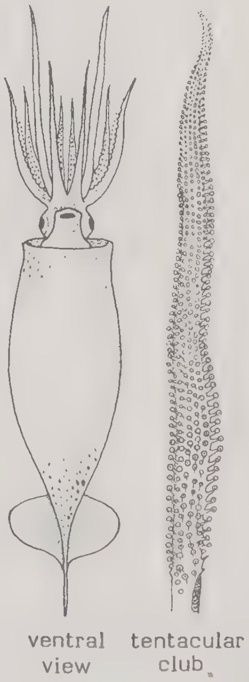
Lepidoteuthidae (Pholidoteuthis)

Fig. 48


4 rows of suckers
dorsal view
tentacular club

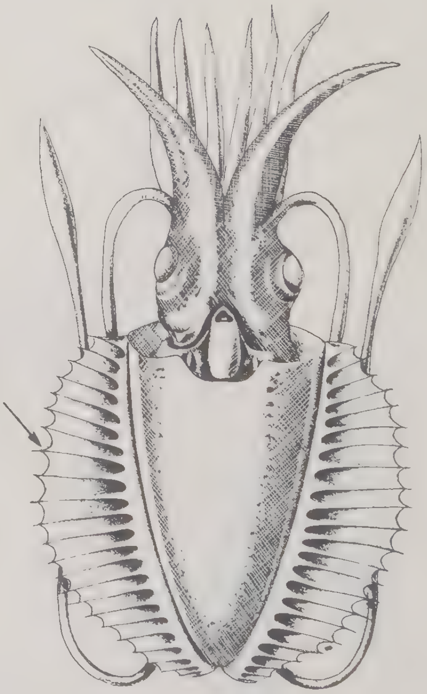
Brachioteuthidae (Brachioteuthis)

Fig. 51


ventral view
tentacular club

Batoteuthidae (Batoteuthis)

Fig. 50



ventral view
Ctenopterygidae (Ctenopteryx)

Fig. 49

20a. Ventral surface of eye with a row of photophores; buccal membrane with 8 separate lappets (Fig. 52) .... **Family Lycoteuthidae**

20b. No photophores on eyes; buccal membrane with 7 lappets or less

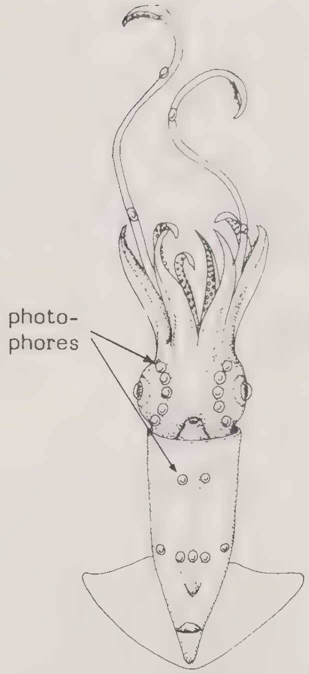
  21a. Surface of mantle, head and arms covered with numerous photophores (usually large and distinct) (Fig. 53) .... **Family Histioteuthidae**

  21b. Surface of mantle and head without photophores (arms may have a few photophores)

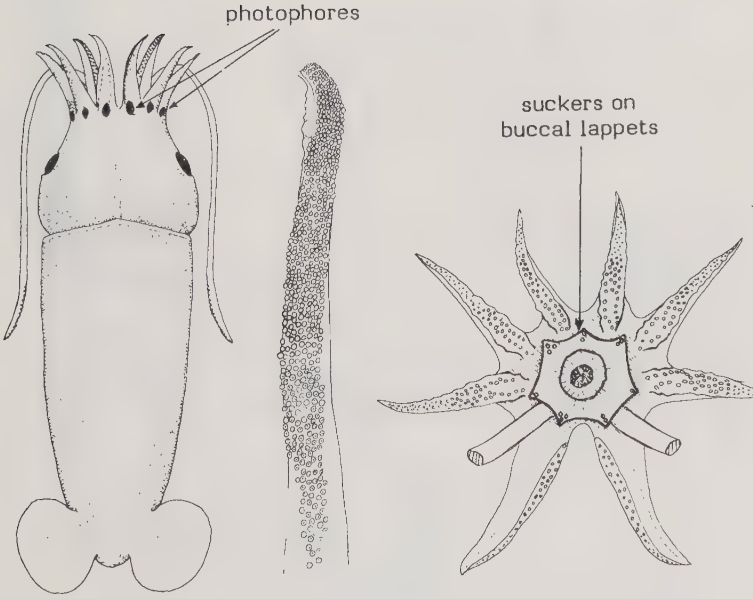
    22a. Minute suckers present on oral surface of buccal lappets (Fig. 54) .... **Family Bathyteuthidae**

    22b. No suckers on oral surface of buccal lappets

      23a. Many small to minute suckers (or suckers and knobs) at proximal end of manus (Figs 55, 56)



ventral view
Lycoteuthidae (Lycoteuthis) Fig. 52

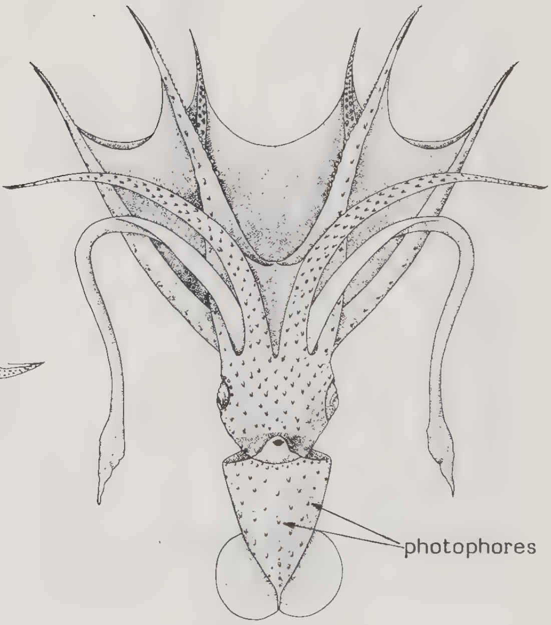


dorsal view

tentacular club

oral view of arms and buccal membrane

Bathyteuthidae (Bathyteuthis) Fig. 54



ventral view
Histioteuthidae (Histioteuthis) Fig. 53

24a. Medial posterior borders of fins slightly convex; carpal knobs in a single dorsal row or absent; small size (Fig. 55) .... **Family Neoteuthidae**

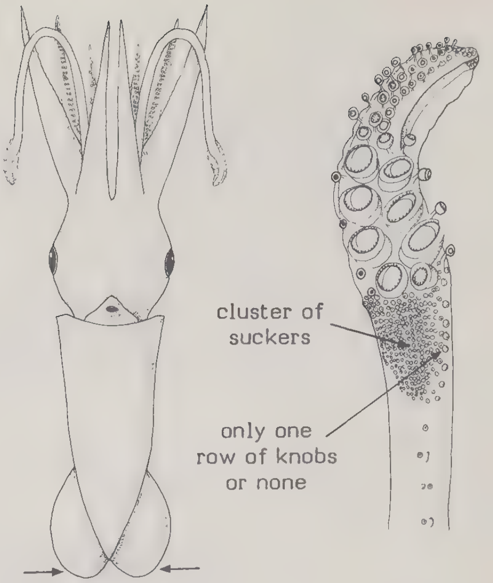
24b. Medial posterior borders of fins concave; carpal knobs in a cluster alternating with carpal suckers; attains very large size (Fig. 56) ....**Family Architeuthidae**

23b. No cluster of small suckers at proximal end of manus (Fig. 57) .... **Family Psychroteuthidae**

11b. Funnel-locking apparatus not a simple, straight groove and ridge

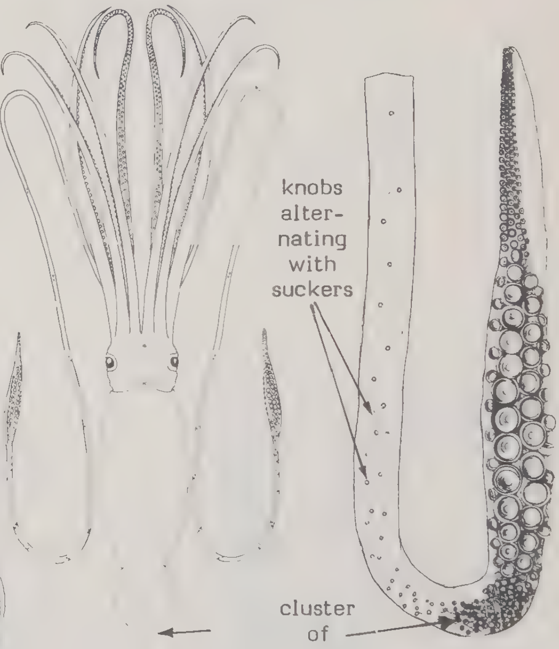
25a. Funnel locking-cartilage with a longitudinal and a transverse groove, ⊥-shaped or ⊣-shaped (Fig. 42b,c)

26a. Funnel locking-cartilage with a longitudinal groove crossed by a transverse groove at its posterior end, -shaped; fins less than 60% of mantle length (Fig. 58) .... **Family Ommastrephidae**


cluster of
suckers
only one
row of knobs
or none

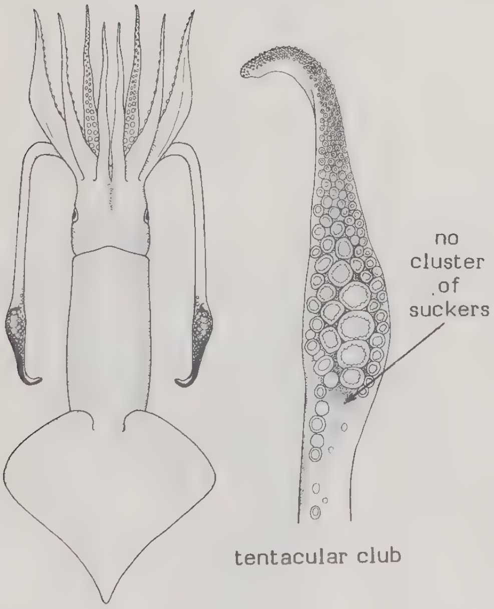
ventral view tentacular club

Neoteuthidae (Alloteuthis) Fig. 55


knobs
alter-
nating
with
suckers
cluster
of
suckers

dorsal view tentacular club

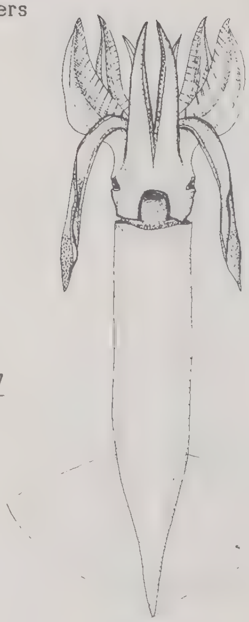
Architeuthidae (Architeuthis) Fig. 56

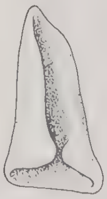

no
cluster
of
suckers

tentacular club

dorsal view

Psychroteuthidae (Psychroteuthis) Fig. 57





funnel-locking apparatus

ventral view

Ommastrephidae (Ommastrephes) Fig. 58

26b. Funnel locking-cartilage with a longitudinal groove from which a shorter groove branches medially, ⊣ -shaped; fins more than 80% of mantle length (Fig. 59) .... **Family Thysanoteuthidae**

25b. Funnel locking-cartilage oval, triangular or oval with inward projecting knobs (Figs 42d, e,f)

27a. Funnel locking-cartilage oval with 1 or 2 knobs directed toward the centre of the concavity (Fig. 42d)

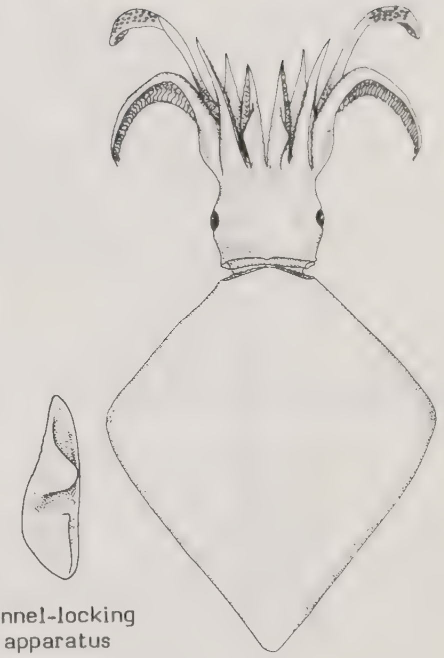
28a. Club with only 4 rows of suckers (Fig. 60) .... **Family Chiroteuthidae**

28b. Club with many (more than 15) rows of minute suckers (Fig. 61) .... **Family Mastigoteuthidae**

27b. Funnel locking-cartilage oval or subtriangular, without knobs (Fig. 42e,f)

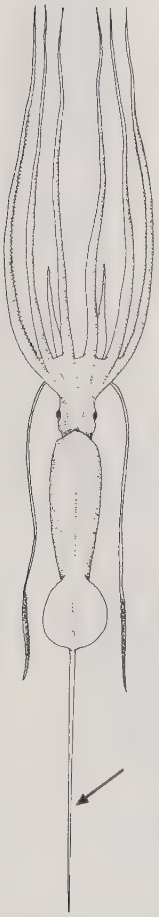
29a. Suckers on arms in 4 to 6 rows; tail extremely long (greater than mantle length) (Fig. 62) .... **Family Joubiniteuthidae**

29b. Suckers on arms in 2 rows; tail short (less than half of mantle length) or absent



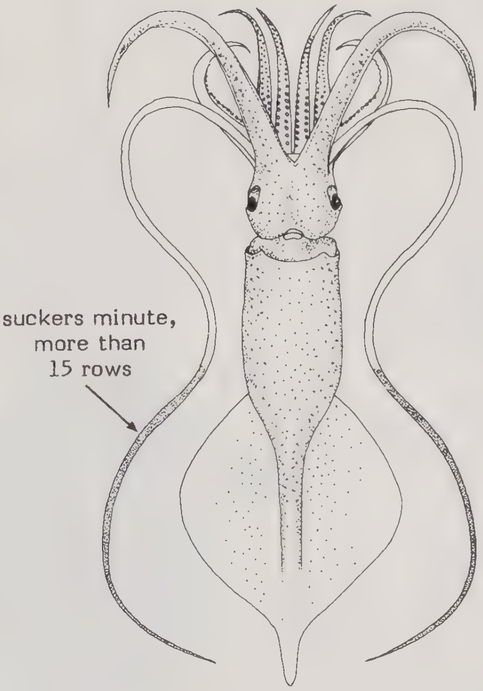
dorsal view
Thysanoteuthidae (Thysanoteuthis)

Fig. 59



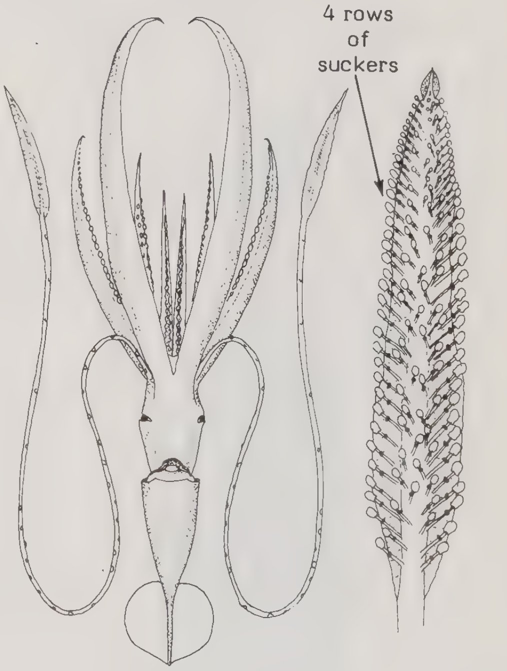
dorsal view
Joubiniteuthidae
(Joubiniteuthis)

Fig. 62



ventral view
Mastigoteuthidae (Mastigoteuthis)

Fig. 61



ventral view

tentacular club

Chiroteuthidae (Chiroteuthis)

Fig. 60

30a. Suckers on tentacular club in 4 longitudinal rows; mantle free dorsally (Fig. 63) .... **Family Cycloteuthidae**

30b. Suckers on tentacular club in 8 or more longitudinal rows; mantle fused dorsally to head (Fig. 64) .... **Family Promachoteuthidae**

10b. Funnel fused to mantle on each side; no funnel-mantle locking apparatus present

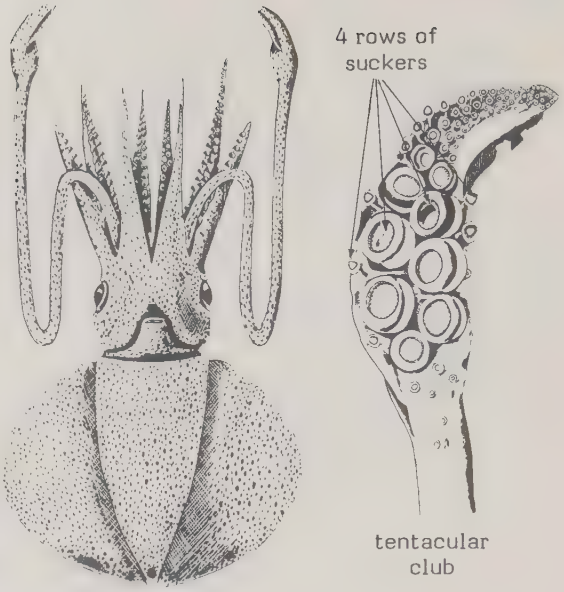
31a. Mantle free dorsally, articulates with head by ridge and groove (Fig. 65) .... **Family Grimalditeuthidae**

31b. Mantle fused dorsally with head (Fig. 66) .... **Family Cranchiidae**

1b. Eight circumoral appendages (arms only)

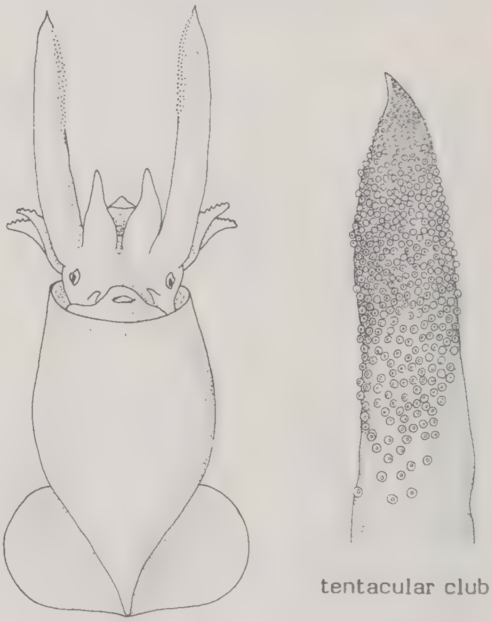
32a. Suckers stalked (with chitinous rings); internal shell a chitinous, thin, broad, plate; a pair of small filamentous circumoral appendages in pouch between bases of arms I & II; light organ (photophore) present at base of each fin and medial to each eye dorsally; colour black (Fig. 67) .... **Order Vampyromorpha** (monotypic order)

32b. Suckers sessile, without stalks and without chitinous rings; internal shell vestage either small cartilaginous rods or a U-shaped support; secondary filamentous appendages and light organs absent; colour to dark maroon, but never black .... **Order Octopoda**



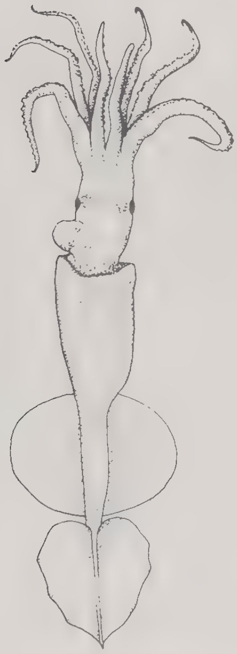
ventral view

Cycloteuthidae (Discoteuthis) Fig. 63



ventral view

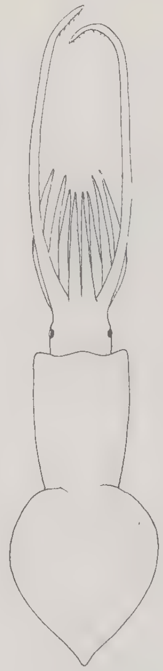
Promachoteuthidae (Promachoteuthis) Fig. 64



ventral view

Grimalditeuthidae (Grimalditeuthis)

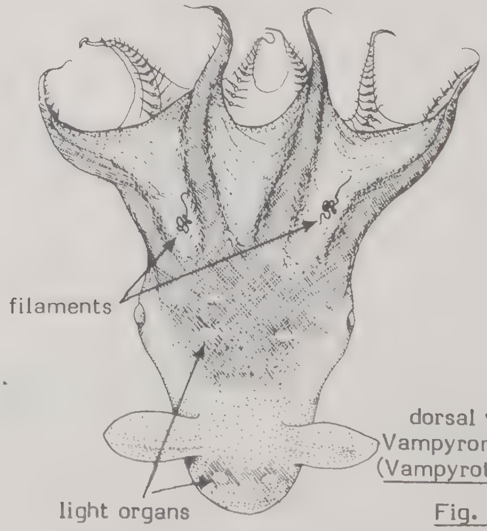
Fig. 65



dorsal view

Cranchiidae (Mesonychoteuthis)

Fig. 66



dorsal view

Vampyromorpha (Vampyroteuthis)

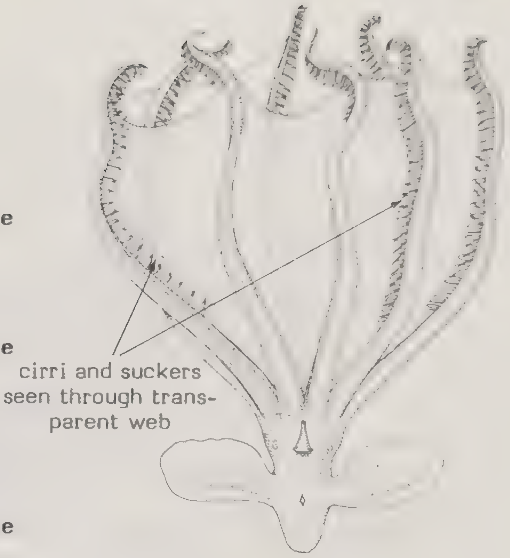
Fig. 67

33a. Cirri present on arms

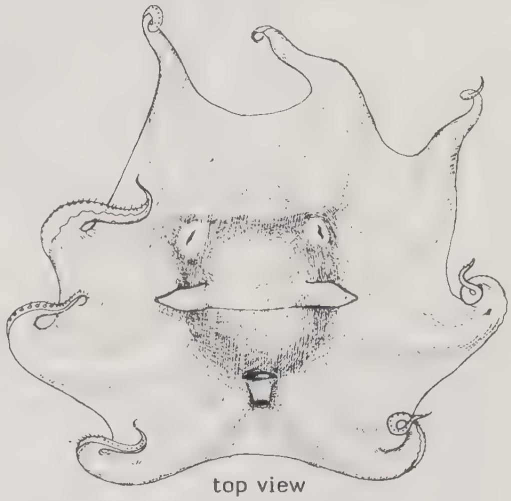
- 34a. Secondary web present; body elongate with prominent head; shell vestige saddle-like (Fig. 68) ...... **Family Cirroteuthidae**
- 34b. Secondary web absent; body flattened along dorsoventral axis; shell vestige straight or slightly bent (Fig. 69) .... **Family Opisthoteuthidae**

33b. Cirri absent on arms

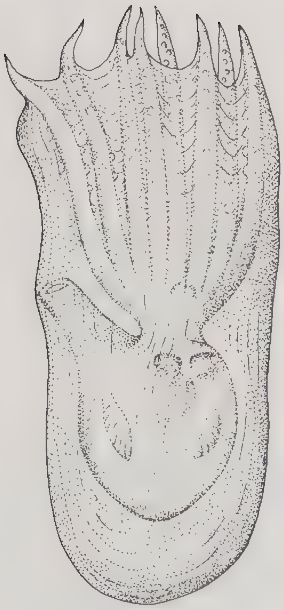
- 35a. Body gelatinous
    - 36a. Suckers on arms biserial (Fig. 70) .... **Family Alloposidae**
    - 36b. Suckers on arms uniserial (Fig. 71)
        - 37a. Stomach posterior to "liver" (= digestive organ) (Fig. 71) ....**Family Bolitaenidae**
        - 37b. Stomach anterior to "liver" (= digestive organ)
            - 38a. Mantle opening reduced to 2 small lateral slits; eyes, elongate, tubular (Fig. 72) .... **Family Amphitretidae**


cirri and suckers seen through transparent web

ventral view
Cirroteuthidae (Cirrothauma) Fig. 68

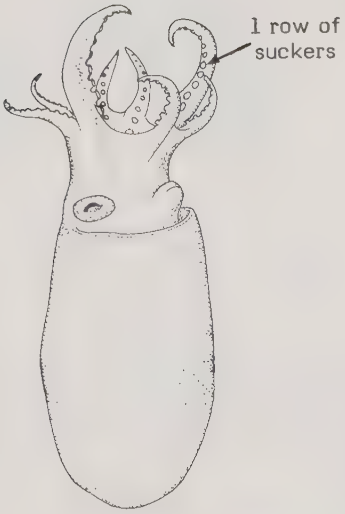


top view
Opisthoteuthidae
(Opisthoteuthis) Fig. 69



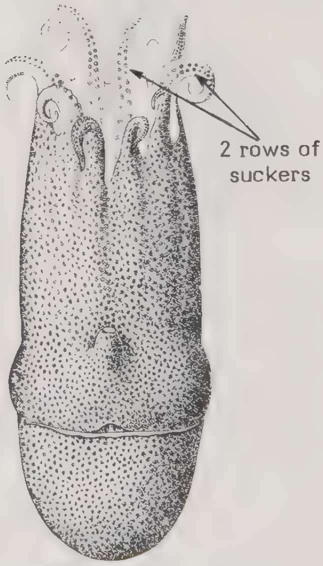
dorso-lateral view
Amphitretidae (Amphitretus)

Fig. 72



lateral view
Bolitaenidae (Japetella)

Fig. 71



ventral view
Alloposidae (Alloposus)

Fig. 70

38b. Mantle opening wide; eyes small (Fig. 73) .... **Family Vitreledonellidae**

35b. Body firm

39a. Water pores present (Fig. 74)

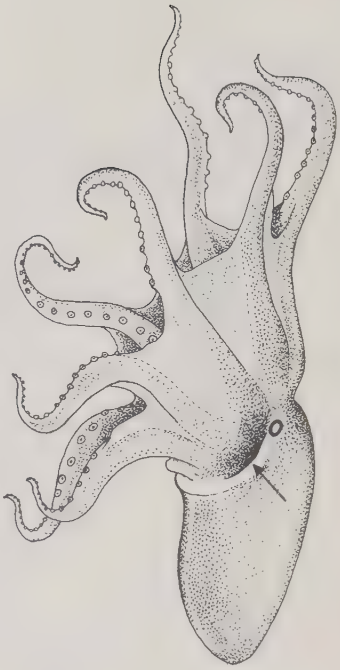
40a. Water pores present both dorsally and ventrally; web very deep; surface of mantle smooth, unsculptured (Fig. 74) ..... **Family Tremoctopodidae**

40b. Water pores present ventrally only; web greatly reduced; surface of mantle heavily sculptured with tubercles in a reticulate pattern (Fig. 75) .... **Family Ocythoidae**

39b. Water pores absent; web normal, reduced or absent

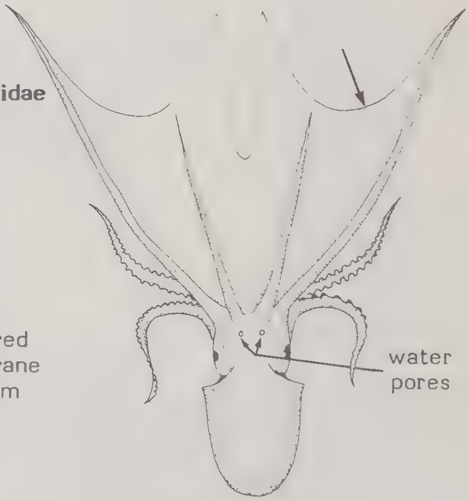
41a. Males very small (smaller than females); hectocotylus (left third arm) temporarily coiled in sac below eye, with extremely long filamentous tip; females with dorsal arms I each with broad, membranous flap that secrets and holds a thin, shell-like egg case (Fig. 76) .... **Family Argonautidae**

41b. Males with left or right third arm hectocotylized (never in pocket); with spoon-shaped, non-filamentous tip; females without dorsal arm flaps; egg case always absent (Fig. 77) .... **Family Octopodidae**



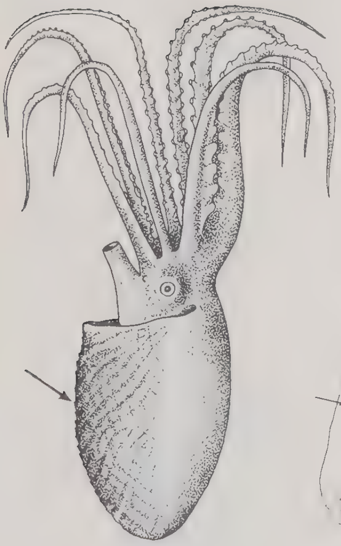
lateral view
Vitreledonellidae (Vitreledonella)

Fig. 73



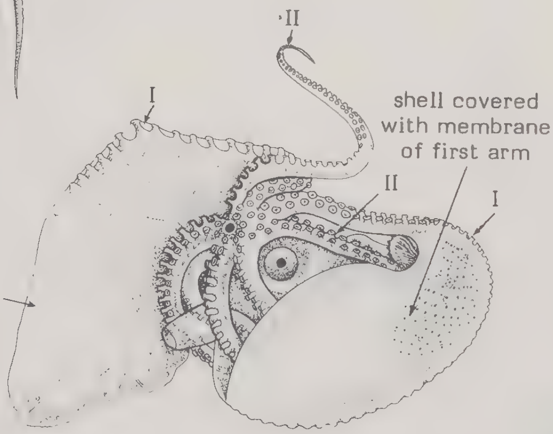
dorsal view
Tremoctopodidae (Tremoctopus)

Fig. 74



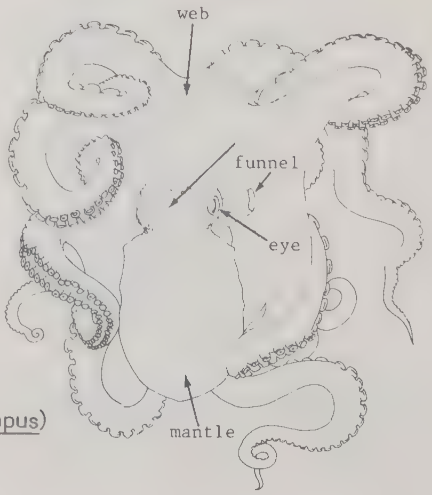
lateral view
Ocythoidae (Ocythoe)

Fig. 75



lateral view of female
Argonautidae (Argonauta)

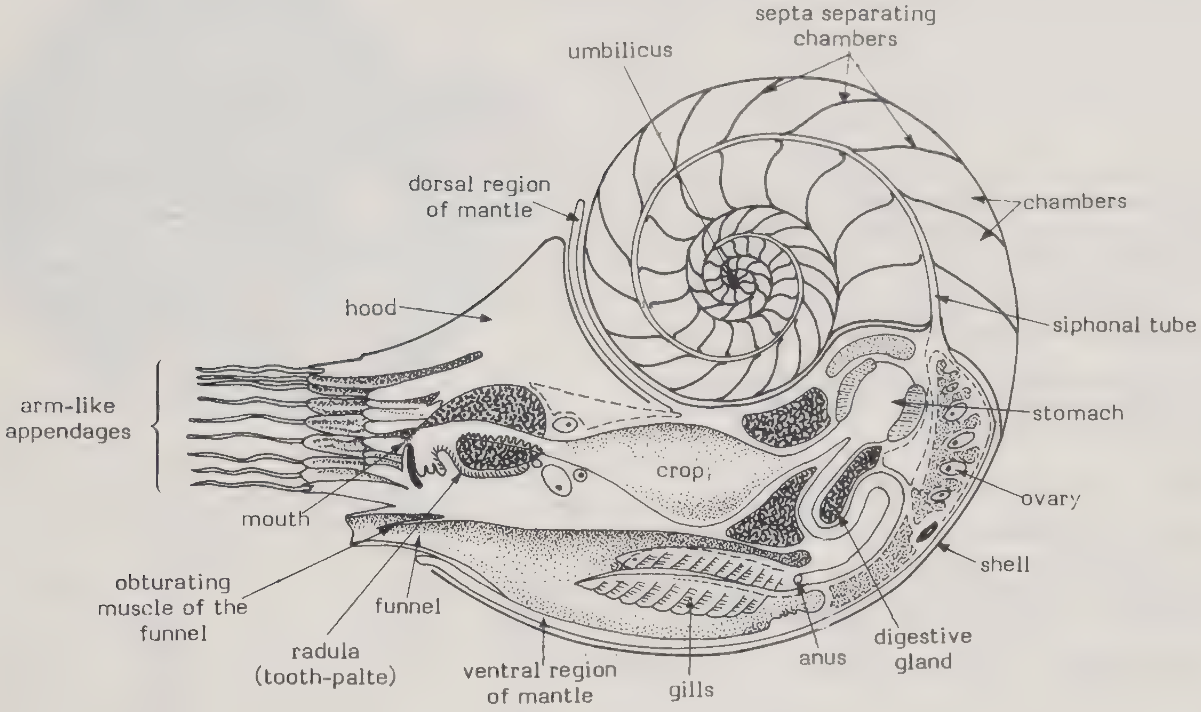
Fig. 76



dorsal view
Octopodidae (Octopus)

Fig. 77

2. CHAMBERED NAUTILUSES (Order Nautiloidea)


septa separating chambers
umbilicus
dorsal region of mantle
chambers
hood
siphonal tube
arm-like appendages
stomach
crop
ovary
mouth
shell
obturating muscle of the funnel
funnel
radula (tooth-palte)
ventral region of mantle
gills
anus
digestive gland

schematic cross section of a Nautilus

The living chambered nautiluses are limited to four extant species in the genus Nautilus, the sole survivors of a once extremely speciose subclass. They possess a coiled, pearly, external shell punctuated with chambers; the animal lives in the outermost chamber with its body attached to the septum (posterior wall of the chamber). A siphonal tube penetrates each septum and serves as a wick to remove fluid from the former living chambers, thus enabling the animal to regulate its bouyancy through control of fluid and gas in the outermost chambers. Nautilus has 2 pairs of gills, unique in living cephalopods, and up to 47 pairs of circumoral arm-like appendages - more in females (up to 94) than in males (up to 63); suckers are lacking; the eyes are simple, without lenses; the funnel or infundibulum, consists of 2 lobes that fold together to form a tube-like structure that serves for locomotion. Chromotophores and ink sac are lacking. Geographically limited to the tropical Indo-West Pacific, nautiluses live in association with the bottom, primarily reefs, from near the surface to about 500 m depth.

2.1 FAMILY NAUTILIDAE Blainville, 1825 NAUT

Nautilidae Blainville, 1825, Man.Malacol.Conchyl., 1825:386.

FAO Names : En - Chambered nautiluses
Fr - Nautiles
Sp - Nautilos

General Remarks on the Family : The recent nautiloids are represented by only four living species of Nautilus (Saunders, 1981). All of these are found in the Indo-West Pacific region and several of these species are of commercial value as food, largely at the artisanal and subsistence levels, and in the shell curio trade, e.g., in India, Indonesia and the Philippines.

Species Currently Recognized : Code numbers are given for those species for which further information is given in this catalogue.

Nautilus belauensis Sanders, 1981; distribution Palau, western Caroline Islands
Nautilus macromphalus Sowerby, 1849 NAUT Naut 1
Nautilus pompilius Linnaeus, 1758 NAUT Naut 2
Nautilus scrobiculatus (Lightfoot, 1786); distribution Solomon Islands and New Guinea

Nautilus macromphalus Sowerby, 1849

NAUT Naut 1

Nautilus macromphalus Sowerby, 1849, Thes.Conchyl., 2:464.

Synonymy : None.

FAO Names :
En - Bellybutton nautilus
Fr - Nautile bouton
Sp - Nautilo ombligo

Diagnostic Features : Umbilicus a deep concavity, not filled with a concretion; colour markings on shell reduced.

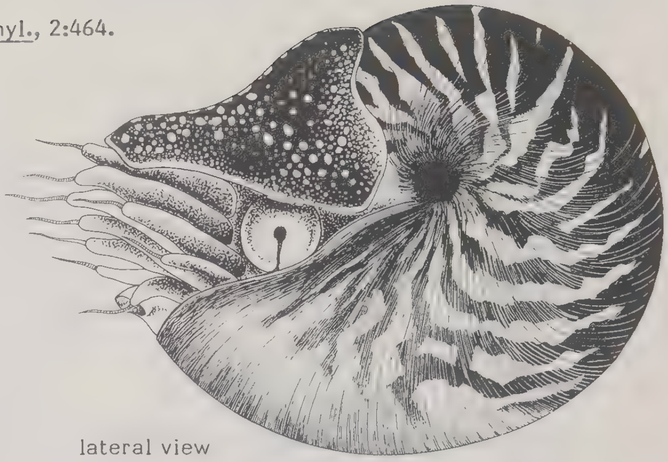
Geographical Distribution : Western Pacific; New Caledonia and Loyalty Islands.

Habitat and Biology : Continental shelf and slope, from the surface to about 500 m (?) depth, associated with hard bottoms.

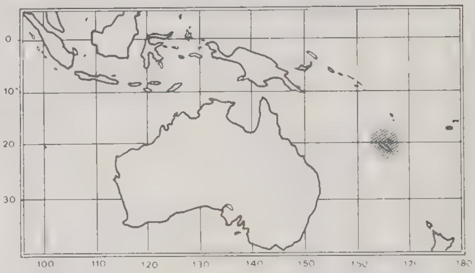
Size : Maximum shell diameter about 20 cm.

Interest to Fisheries : Consumed locally; also supports a small fishery for public aquarium and research trade. Collected alive at about 65 m depth on the outer slope of the Barrier Reef in New Caledonia; in the Coral Sea, trapped at 300 to 400 m.

Local Names : NEW CALEDONIA : Chambered nautilus.



lateral view



Nautilus pompilius Linnaeus, 1758

NAUT Naut 2

Nautilus pompilius Linnaeus, 1758, Syst. Nat., ed.10:709.

Synonymy : Nautilus ambiguus Sowerby, 1849; ? Nautilus stenomphalus Sowerby, 1849; Nautilus alumnus Iredale, 1944; ? Nautilus repertus Iredale, 1944; varieties: N. p. perforatus, Willey 1896; N. p. marginalis, Willey, 1896; N. p. moretoni, Willey, 1896.

FAO Names :
En - Emperor nautilus
Fr - Nautile flammé
Sp - Nautilo común

Diagnostic Features : Umbilicus filled in with a concretion; flame-striped colour pattern, extending across nearly entire shell.

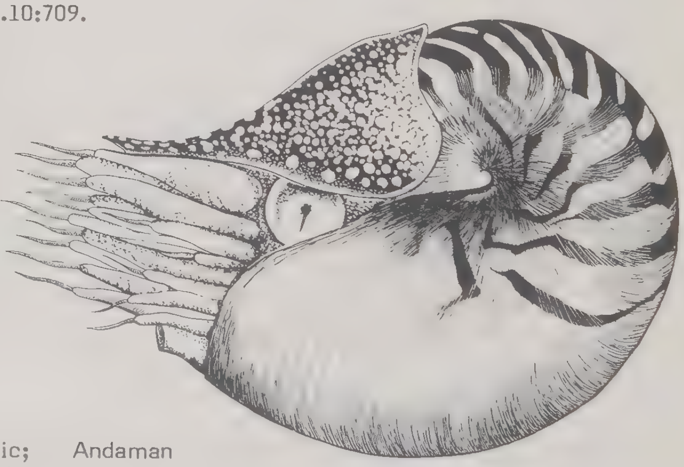
Geographical Distribution : Indo-West Pacific; Andaman Islands, Amboina, the Philippines, New Guinea to Fiji; Australia.

Habitat and Biology : Continental shelf and slope from near the surface to about 750 m depth, associated with hard bottoms, particularly coral reefs. Undergoes diel vertical migrations.

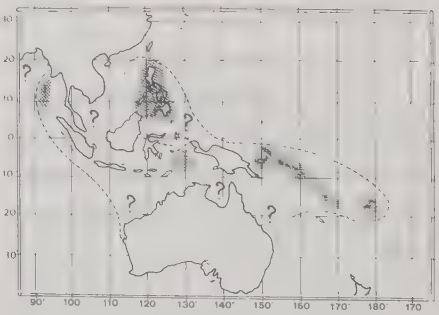
Size : Maximum shell diameter about 20 cm.

Interest to Fisheries : Supports shell trade, mostly from beach-drift specimens, and subsistence and artisanal fisheries in Negros (the Philippines). Captured in bamboo fish traps at 60 to 240 m depth. The meat is sold in local markets and the shells sent to Cebu City for the shell trade.

Local Names : NEW CALEDONIA, PHILIPPHINES: Chambered nautilus.



lateral view



3. CUTTLEFISHES (Order Sepioidea)

Cuttlefishes are characterized by the following features: shell calcarious (Sepia, Spirula) or chitinous (sepiolids); 10 circumoral appendages; tentacles retractile into pockets; suckers with chitinous rings; posterior fin lobes free, not connected at midline; eye covered with a transparent membrane, false eyelids present (except Spirula); 1 pair of gills, without branchial canal between afferent and efferent branchial blood vessels; liver divided or bilobed; each tooth of radula with a single projection; buccal membrane present; olfactory organ a ciliated pit.

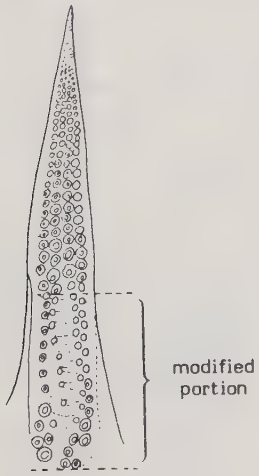
This order comprises five families, two of which (the Idiosepiidae and Spirulidae) are considered inedible and hence are not included in this catalogue. Of the remaining three families, the Sepiidae are of significant commercial value to artisanal and industrial fisheries, and the Sepiolidae are exploited by many artisanal and subsistance fisheries; while the Sepiadariidae are not fished at present, one species might be of potential interest. The combined catch of cuttlefishes made up about 12 to 16% of total cephalopod catches in recent years, roughly fluctuating between 150 000 and 210 000 metric tons (FAO, 1983).

3.1 FAMILY SEPIIDAE Keferstein, 1866

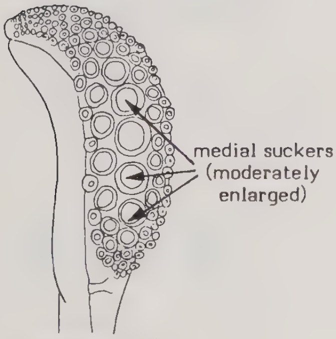
SEP

Sepiidae Keferstein, 1866, Bronn's Klass.Ordn.Thierreichs, 1862-66:1441.

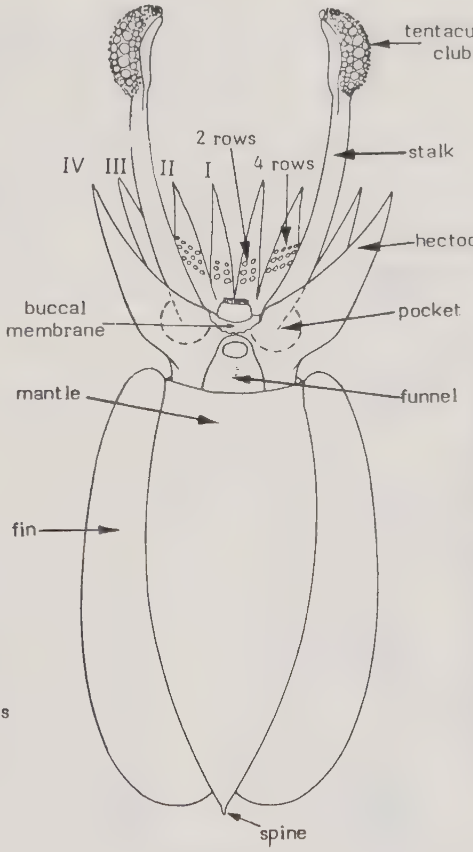
FAO Names : En - Cuttlefishes; Fr - Seiches; Sp - Sepias, Cloquitos



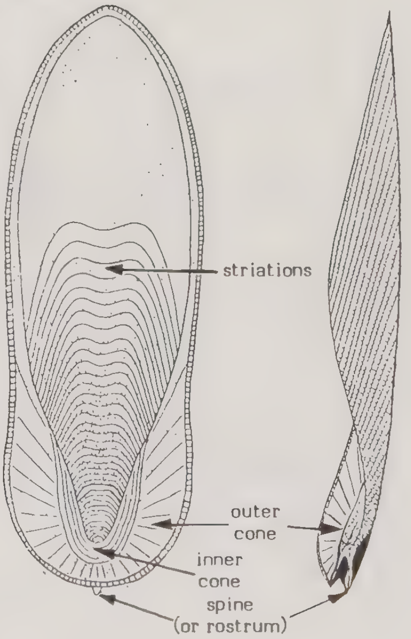
left arm IV in male hectocotylized



tentacular club



ventral view
diagram of basic cuttlefish features



ventral view

lateral view

Diagnostic Features : Cuttlebone (shell or sepion) internal, chalky (calcareous), porous, finely laminate. Mantle broad, robust, sac-like, slightly flattened dorsoventrally; fins narrow, long (more or less equal to mantle length; posterior fin lobes free, not connected at midline; 10 circumoral appendages; arms with 2 to 4, and tentacles with 4 to 8 or more longitudinal rows of suckers; tentacles retractile into pockets on ventrolateral sides of head. Eyes covered with a corneal membrane. Colour: variable due to the great complex of chromatophores (pigment cells); browns, blacks, yellows, and reds are the dominating colours.

Geographical Distribution : Restricted to the Old World (i.e., absent from the Americas).

Habitat and Biology : Cuttlefishes are primarily demersal inhabitants of nearshore and continental shelf zones in warm and temperate waters. Although excellent swimmers, they generally are bottom dwellers. Habitats range from rocky, sandy and muddy bottoms to grassflats, seaweed beds, coral reefs, etc. Many (but not all) species are known to migrate seasonally in response to temperate changes. Spawning usually takes place with an increase in water temperature, sometimes twice a year in areas where the hydrographical regime is strongly seasonal. During mating, males use their modified arm(s) (hectocotylus) to transfer spermatophores to the females. Cuttlefishes spawn relatively few and large eggs which the female attaches in grapelike clusters to plants, debris, gravel and other substrates. Sexual maturity often is attained as early as a few months after hatching and it is not uncommon to find juveniles from the spring brood participating in autumn spawning. Post-spawning mortality is usually high, particularly in females. Longevity ranges between 1 and 3 years.

Cuttlefishes prey on crabs, shrimps and small fishes. Cannibalism seems to be rather common and has been interpreted as an efficient "strategy" to overcome temporary shortage of suitable sized food items (Caddy, 1979). They are opportunistic, subdominant predators thriving upon the depletion of their major finfish predators. This has been shown, for example, in the West African demersal trawl fishery where a shift from sparids to cuttlefishes and octopuses was noticed in coincidence with heavy fishing pressure on the sparid stocks.

Interest to Fisheries : Together with the two minor families, Sepiadariidae and Sepiolidae, the Sepiidae accounted for 178 000 metric tons or 13.6% of the cephalopod world catch in 1981, the most important genus being Sepia.

Cuttlefish - catches by major fishing areas and countries

(Source: FAO, 1983)

Fishing Area	Country or region	% of catch in Fishing Area in 1981	catches ('000 metric tons) 1980	1981
E. Central Atlantic (34)			30 700	29 100
	Spain	54.6	18 700	15 900
	Morocco	27.5	4 200	8 000
Mediterranean (37)			18 400	17 500
	Italy	70.9	13 600	12 400
Western Indian Ocean (51)			15 800	11 700
	Yemen, DPR	82.1	9 600	9 600
	Japan	8.5	3 700	1 000
Northwestern Pacific (61)			70 100	65 700
	Korea, Rep.	58.0	38 900	38 100
	Taiwan Island	28.8	19 000	18 900
	Japan	10.8	10 400	7 100
Western Central Pacific (71)			45 500	44 600
	Thailand	48.4	23 500	21 300
	Viet Nam	28.9	12 900	12 900
	Malaysia	10.3	3 700	4 600

The above table summarizes the catch data available for the most important world fishing areas and identifies the major cuttlefish exploiting countries, which also are the prime consumers. These are mainly the southeast Asian countries and nations bordering the Mediterranean Sea. Many of the above figures should be considered as highly conservative because of the general tendency to underestimate the artisanal component of landings, which usually are not properly recorded in national statistics. In this connection, the General Fisheries Council for the Mediterranean (GFCM) suggests, for example, that the Yugoslavian artisanal demersal catch in the early seventies was at the same order of magnitude as the bottom trawl landings.

In the industrial-type fisheries, cuttlefishes usually are taken only as bycatch to other target species in bottom trawls, even in cases where they make up a sizeable portion of the catch. They are, on the other hand, actively sought by the artisanal fisheries which utilize highly selective gear and fishing techniques based on knowledge of the biology and behaviour of the species. Such techniques include the use of aggregation devices (light, substrates for egg deposition), live or artificial lures (for example, live females are used to attract males), and a variety of fishing gear, such as harpoons, spears, trammel nets, pound nets, hoop nets, lines, jigs, baited pots, etc.

The flesh of most cuttlefishes is rather tender and excellent for human consumption. It is marketed fresh, frozen, canned and dried ("surume").

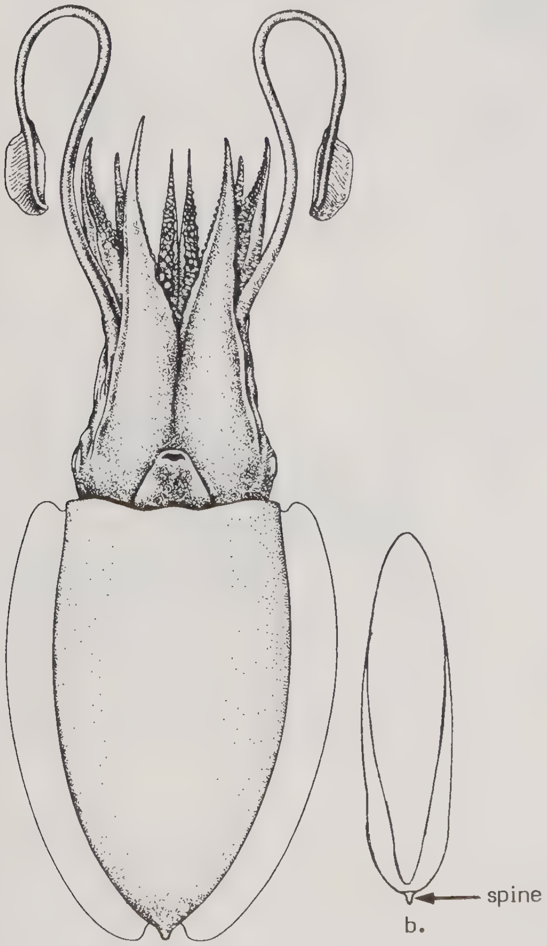
Key to Genera of Sepiidae :

1a. Cuttlebone calcified only in posterior half, anterior half chitinous .... **Hemisepius**

1b. Cuttlebone entirely calcified

2a. Cuttlebone with spine (rostrum) present on posterior end (Fig.1a) (occasionally damaged or absent); no glandular pore on ventral surface at posterior end of mantle (Fig. 1b) .... **Sepia**

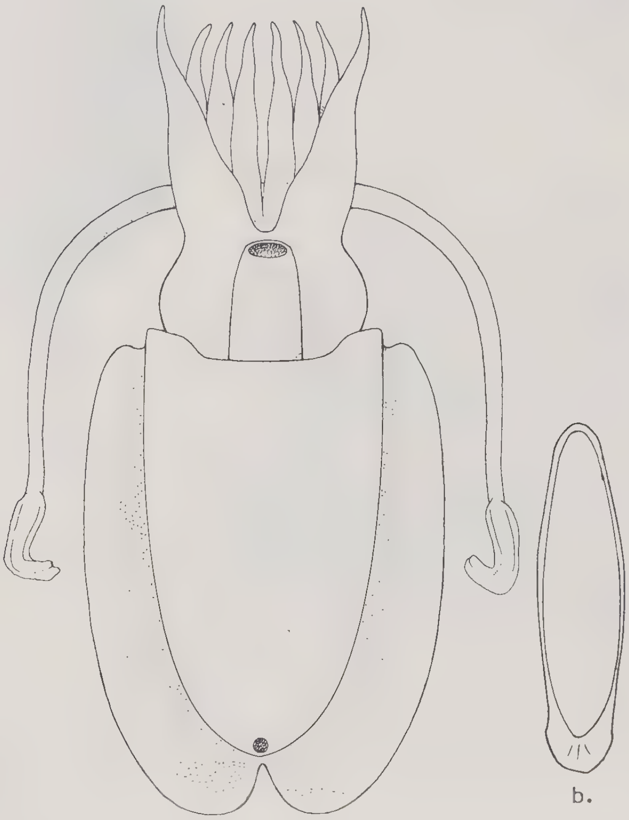
2b. Cuttlebone without spine at posterior end (Fig. 2a); glandular pore present on ventral surface of posterior end of mantle between ends of fins (Fig.2b) .... **Sepiella**



a. ventral view

cuttlebone

Sepia



a. ventral view

cuttlebone

Sepiella

Sepia aculeata Orbigny, 1848

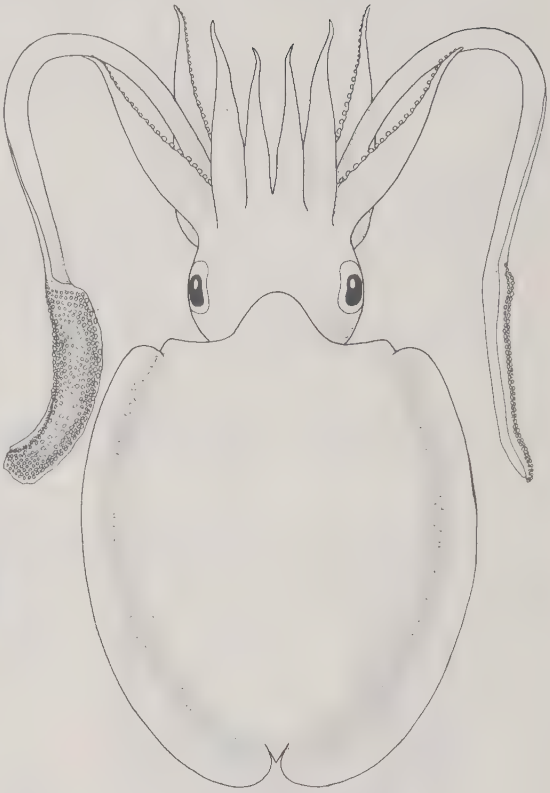
SEP Sep 5

Sepia aculeata Orbigny, 1848 (in 1834-1848), Hist.nat.Ceph.acetab., 287.

Synonymy : Sepia indica Orbigny, 1848 (in 1834-1848).

FAO Names :
En - Needle cuttlefish
Fr - Seiche aiguille
Sp - Sepia con punta

Diagnostic Features : Mantle about half as broad as long. Tentacular club long, slender with 10 to 12 minute, subequal suckers in each row across the club in males, 13 or 14 suckers across in females; club protective membranes not united, extending proximally along oral face of stalk as low ridges. Left arm IV hectocotylized: about 12 normal suckers (3 series) proximally, followed by about 5 or 6 series of very small suckers in ventral longitudinal rows; corresponding suckers of dorsal longitudinal rows extremely minute (or absent) in a deep, smooth groove; suckers normal distally. Colour: dorsal mantle with a fine, dark-pigmented, transverse, reticulate colour pattern; a pale, reflective line along bases of fins.



dorsal view

Geographical Distribution : Indo-Pacific: southern India to South China Sea, East China Sea north to central Japan.

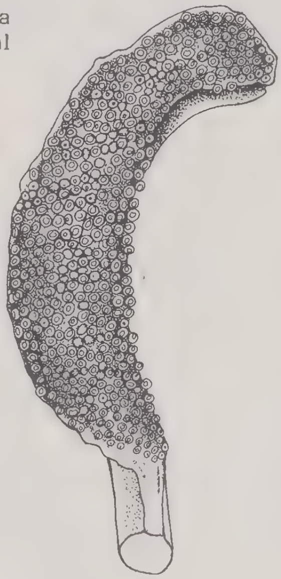
Habitat and Biology : Sepia aculeata is a demersal, neritic species ranging in depth from the shore down to about 60 m. In the Hong Kong area an inshore spawning migration occurs from March to May with concentrations at 5 and 20 m depth.

Size : Maximum mantle length 23 cm and weight 1.3 kg.

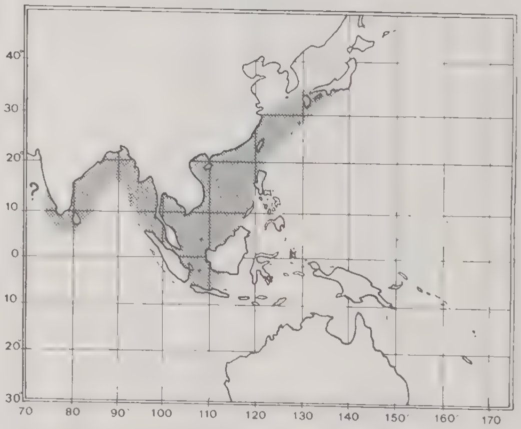
Interest to Fisheries : The thirdmost important commercial cuttlefish in Hong Kong, caught with setnets and seines during the spawning season. The most important commercial cuttlefish in southwest India, caught by trawl with peak landings in October and November.

Local Names : CHINA: Jam mak yue; JAPAN: Ami-monkouika.

Literature : Voss & Williamson (1971, Hong Kong); Tomiyama & Hibiya (1978); Okutani (1980).



tentacular club



Sepia andreana Steenstrup, 1875

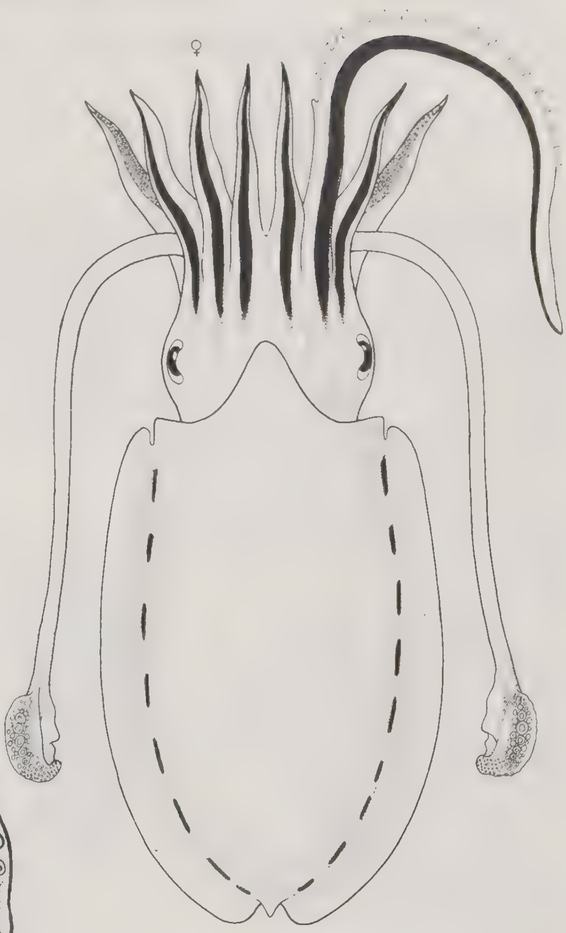
SEP Sep 7

Sepia andreana Steenstrup, 1875, K.danske Vidensk Nat., (5)10(7):474.

Synonymy : None.

FAO Names :
En - Andrea cuttlefish
Fr - Seiche andreana
Sp - Sepia andreana

Diagnostic Features : Mantle length 2½ times width; fins arising posterior to mantle margin. Tentacular club with 8 suckers in transverse rows, the median 4 about 3 times the diameter of suckers on the marginal rows. Arms II in males greatly elongated, 3 times longer than the others, bluntly rounded distally, not tapered, cylindrical in cross-section; left arm IV hectocotylized, with the proximal 10 quadriserial rows of suckers normal, while the distal half bears only rudimentary suckers on swollen peduncular bases; arms II of males with quadriserial suckers in proximal third, then biserial, becoming rudimentary and sparse distally; arms I of both sexes and arms III of males with quadriserial suckers proximally, biserial distally. Shell 6 times longer than wide. Colour: the 3 dorsal pairs of arms with an orange-pigmented reflective stripe along aboral surface.



dorsal view

Geographical Distribution : Western Pacific: from northern Philippines, along the south China coast to central Japan; S. andreana is the northernmost species of cuttlefish in the northwestern Pacific.

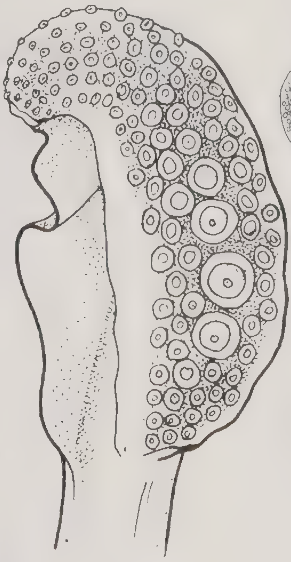
Habitat and Biology : A demersal species occurring in coastal waters to 50 m depth.

Size : Maximum mantle length 12 cm.

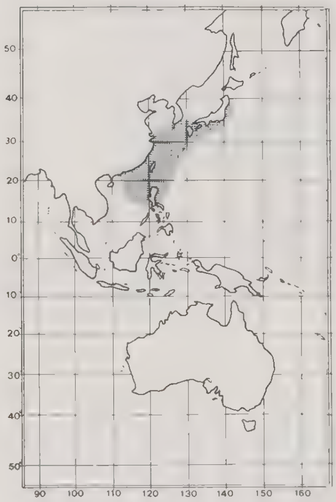
Interest to Fisheries : Separate statistics are not reported for this species which is taken as by-catch in trawl and set net fisheries in northern China.

Local Names :

Literature : Okutani (1980).



tentacular club



Sepia apama Gray, 1849

SEP Sep 8

Sepia apama Gray, 1849, *Cat.Moll.Brit.Mus.*, 103.

Synonymy : ? *Sepia palmata* Owen, 1881; ? *Amplisepia verreauni* Iredale, 1926; ? *Amplisepia parysatis* Iredale, 1954.

FAO Names :

En - Australian giant cuttlefish
Fr - Seiche géante
Sp - Sepia gigante

Diagnostic Features : Adults very large. Sucker-bearing surface of tentacular club raised off the stalk, attached only by a thin membrane; 5 suckers in rows across the manus, median suckers enlarged; swimming keel of club extending along stalk a distance equal to the club length. Web between arms deep: equal to half of arm length between dorsal arms, two thirds of arm length between lateral arms, absent between ventral arms. Three flat, semicircular, flap-like papillae posterior to each eye. Fins broad. Colour: deep maroon.

Geographical Distribution : So far only known from Australia (except the far north) and Tasmania.

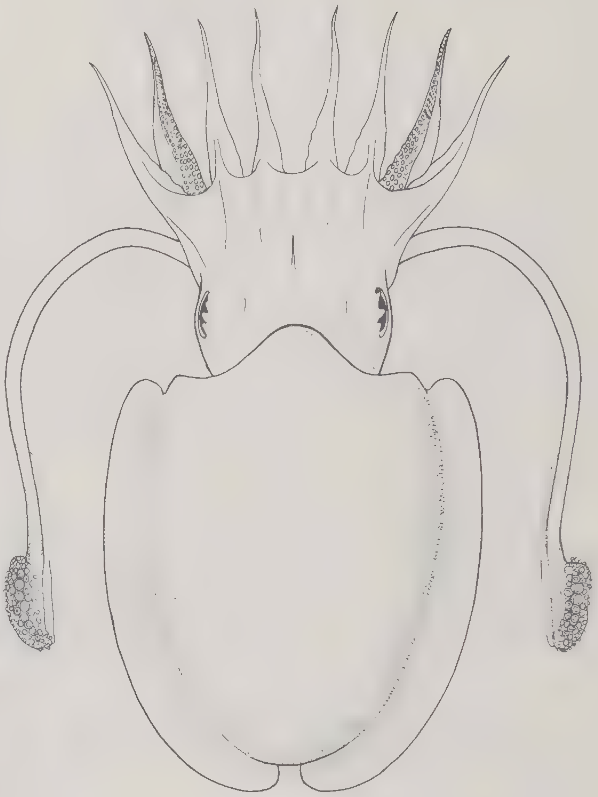
Habitat and Biology : A neritic demersal species with cryptic habits occurring in coral areas, seagrass beds and on open trawl grounds down to at least 35 m depth. Spawning extends from October to December.

Size : Maximum size up to 50 cm mantle length, and weight in excess to 5 kg; one of the largest cuttlefishes.

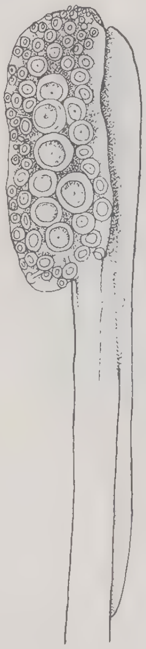
Interest to Fisheries : Presently, no large-scale commercial fisheries exist for the species, but it is commonly seen in fish markets along the southern coast of Australia, where it is caught by hook and line or speared by divers. It is sold for human consumption and also used as bait.

Local Names :

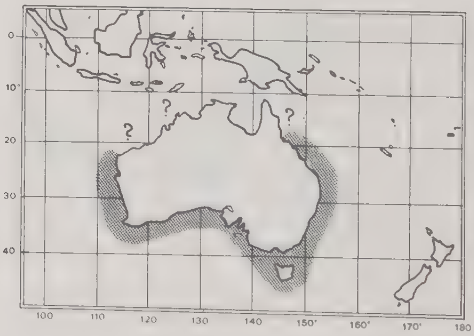
Literature : Okutani (1980).



dorsal view



distal part of tentacle



Sepia arabica Massy, 1916

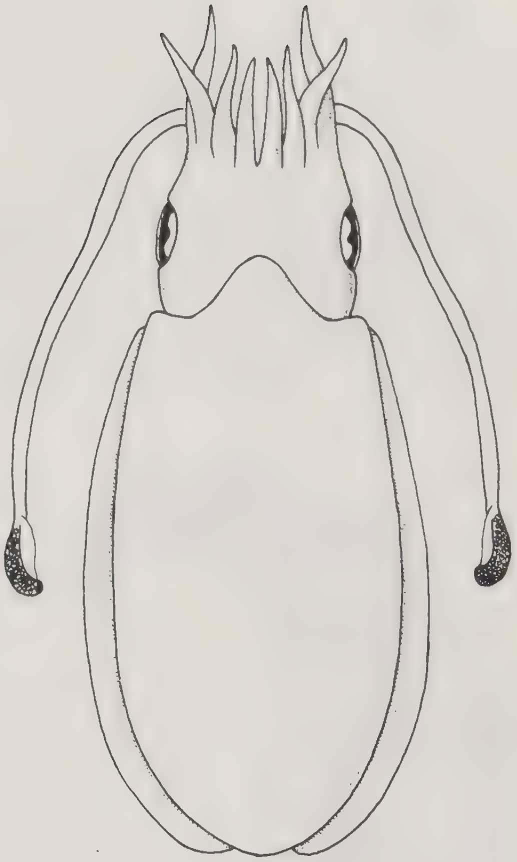
SEP Sep 9

Sepia arabica Massy, 1916, Rec.Indian Mus, 12(5):228.

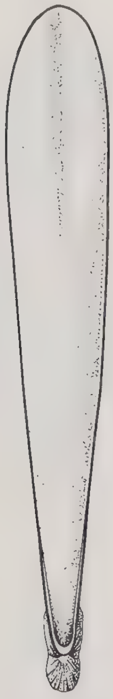
Synonymy : None.

FAO Names : En - Arabian cuttlefish
Fr - Seiche d'Arabie
Sp - Sepia arábiga

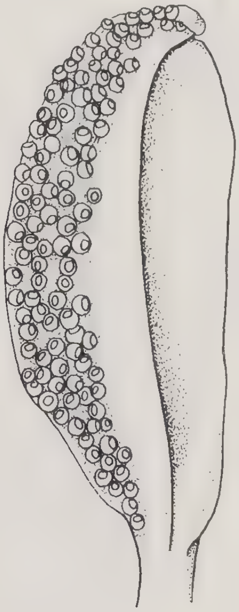
Diagnostic Features : Body elongate, narrow, bluntly pointed posteriorly, the mantle extending dorsally to level with the eyes. Tentacles very slender; clubs crescent-shaped with 5 or 6 suckers in transverse rows across the club, subequal in size; their dorsal protective membrane as broad as sucker-bearing surface, their swimming keel well developed, slightly longer than club. Cuttlebone long, narrow; tapered, very narrow posteriorly; spine lacking.



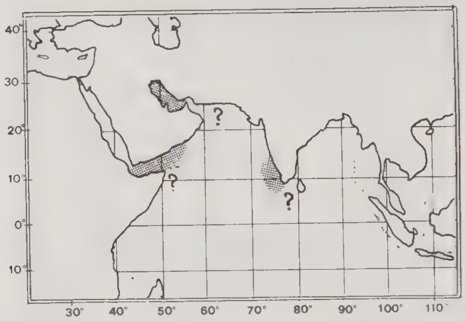
dorsal view



cuttlebone



tentacular club



Geographical Distribution : Northwestern Indian Ocean and southwest India.

Habitat and Biology : Unknown.

Size : Maximum mantle length 7 cm.

Interest to Fisheries : Presently undetermined. The species has been reported from a bottom trawl resource survey in the Gulf of Aden.

Local Names :

Sepia australis Quoy & Gaimard, 1832

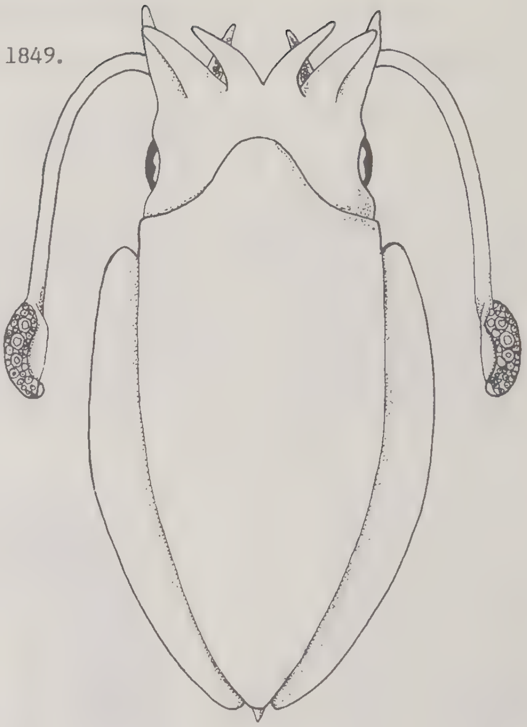
SEP Sep 10

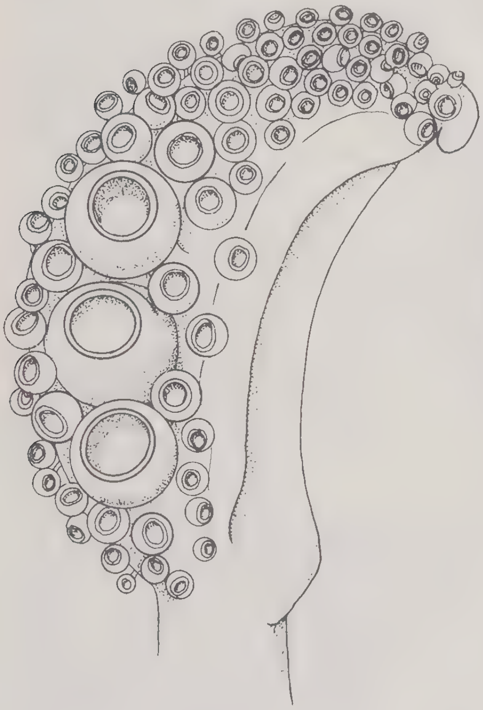
Sepia australis Quoy & Gaimard, 1832, Zool.Astrolabe, 2(1):70.

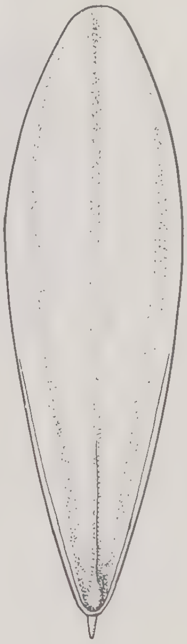
Synonymy : Sepia capensis Orbigny, 1845; Sepia sinope Gray, 1849.

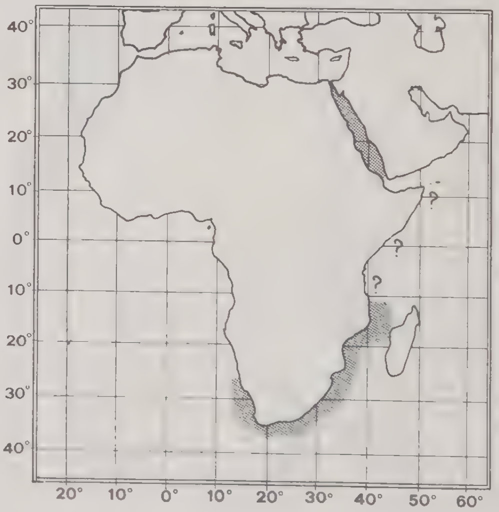
FAO Names :
En - Southern cuttlefish
Fr - Seiche australe
Sp - Sepia austral

Diagnostic Features : Body elongate, oval, narrow and tapering anteriorly and posteriorly. Fins arising several mm posterior to anterior mantle margin. Tentacular club short, slightly recurved, with 5 suckers in transverse rows, 4 proximally; median 3 suckers greatly enlarged, 1 or 2 others less so. Colour: a narrow reddish-brown to orange band along bases of fins; body ventrally as heavily pigmented as dorsally (purple).


dorsal view


tentacular club


cuttlebone



Geographical Distribution : Southeastern Atlantic (Namibia, South Africa) and western Indian Ocean (South Africa to northern Mozambique); Red Sea.

Habitat and Biology : A demersal species, abundant on the upper shelf from 50 to 100 m depth. Its biology is unknown.

Size : Maximum mantle length 5.5 cm.

Interest to Fisheries : At present undetermined.

Local Names :

Literature : Okutani (1980).

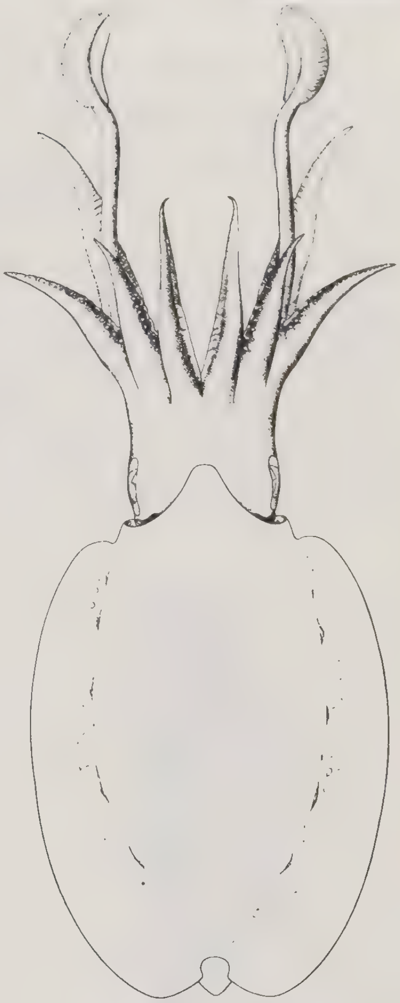
Sepia bertheloti Orbigny, 1839

SEP Sep 2

Sepia bertheloti Orbigny, 1839, Hist.Nat.Iles Canar., 2(2):21.

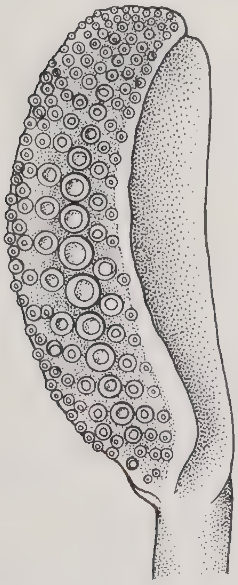
Synonymy : Sepia mercatoris Adam, 1937.

FAO Names : En - African cuttlefish
Fr - Seiche africaine
Sp - Jibia africana

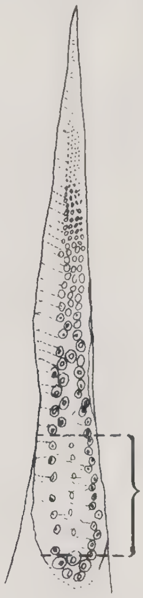


dorsal view

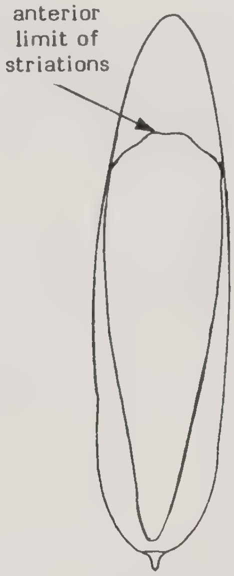
Diagnostic Features : Mantle more than 2 times longer than wide, its dorsal margin projecting strongly as a long, sharp angle. Tentacular club slender, the swimming keel not extending beyond base; protective membranes not united proximally and not extending proximally onto stalk; suckers small, not much larger than arm suckers, 8 suckers arranged in oblique, transverse rows, 3rd in series slightly enlarged. Left ventral arm (IV) (hectocotylus) with 2 to 5 normal suckers at its base and 9 to 13 rows of minute spaced suckers on its proximal third; dorsal protective membrane very broad, almost completely covering suckers. Colour: elongate tubercles along bases of fins with small, light-coloured patches laterally, males with a reddish stripe near lateral border of fins.



tentacular club

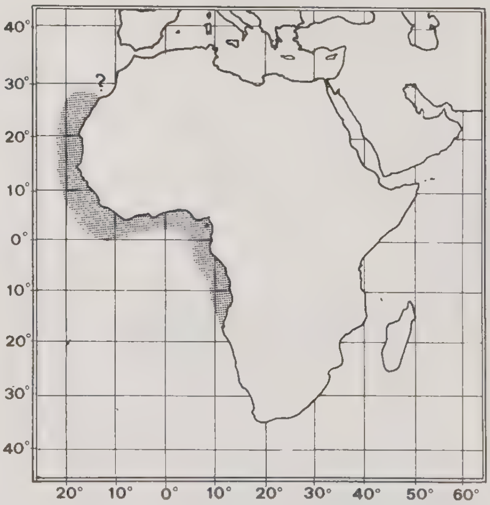


left arm IV of male hectocotylized



cuttlebone

Geographical Distribution : Eastern Atlantic: from 14°S to the Canary Islands.



Habitat and Biology : A neritic, demersal species occurring in open bottom habitats down to 160 m depth, but most abundant between 70 and 140 m. The spawning season extends through summer and autumn; females deposit about 50 to 100 eggs. This species preys on molluscs (including other cephalopods), crustaceans and small fishes. Its lifespan is 1 to 2 years.

Size : Maximum mantle length 17.5 cm in males and 13 cm in females.

Interest to Fisheries : Taken by otter trawls in the cuttlefish fishery off the Canary Islands where greatest concentrations are encountered between 70 and 140 m depth; females predominate in the catches. Off Senegal, it is reported to represent only a minor portion (about 1%) of the total cuttlefish catch taken by trawls and from pirogues (Bakhaukho & Drammeh, 1982). Marketed fresh or deep-frozen for export. Separated statistics are not reported for this species.

Local Names :

Literature : Okutani (1980); Bakhaukho & Drammeh (1982, catches, Senegal).

Sepia braggi Verco, 1907

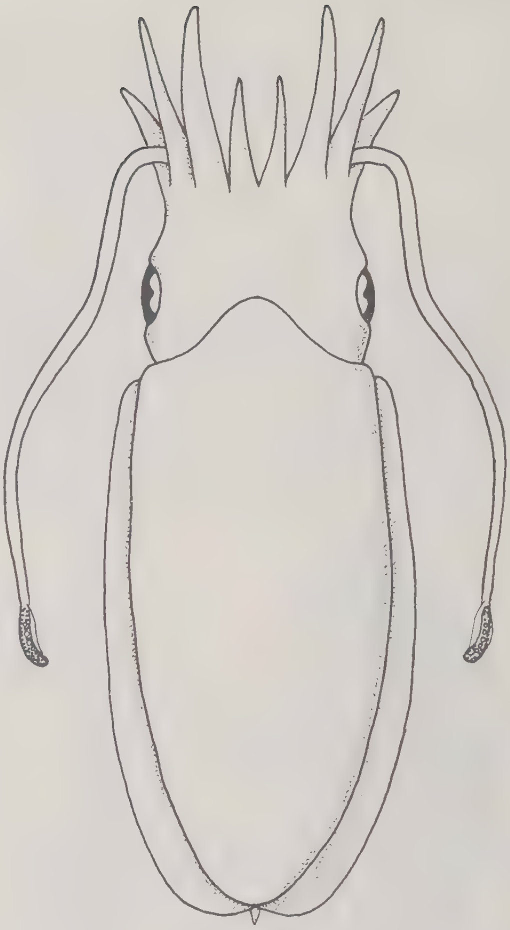
SEP Sep 11

Sepia braggi Verco, 1907, Trans.Roy.Soc.S.Austr., 31:213.

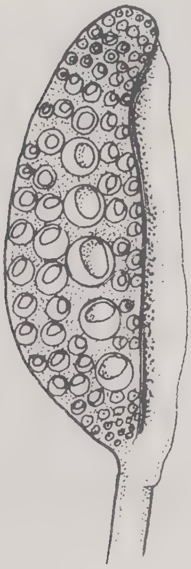
Synonymy : Arctosepia braggi is invalid generic name.

FAO Names : En - Slender cuttlefish
Fr - Seiche gracile
Sp - Sepia grácil

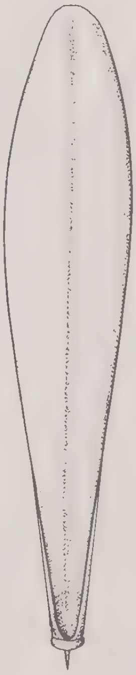
Diagnostic Features : Mantle elongate, 2½ to 3 times longer than wide, its dorsal margin broadly acuminate and projecting anteriorly. Fins relatively broad, united posteriorly, arising posterior to mantle magin. Tentacular club short, swimming keel well developed, extending proximally beyond base; dorsal protective membrane broad, devoid of suckers, widely separated from ventral protective membrane proximally; 5 suckers in transverse rows, finely dentate, 5 or 6 median suckers 2 times the diameter of others.



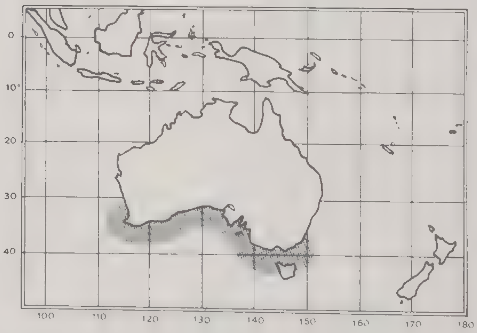
dorsal view



tentacular club



cuttlebone



Geographical Distribution : Southern Australia and Tasmania, western Australia to Cockburn Sound, 32°S.

Habitat and Biology : A demersal species, depth range unknown; so far recorded from 34 to 38 m.

Size : Maximum mantle length 6.5 cm.

Interest to Fisheries : Possibly taken with other cuttlefish in artisanal fisheries along southern Australia.

Local Names :

Remarks : Reported from a bottom-trawl resource survey in the Gulf of Aden but the species identification is doubtful because the distribution as currently understood is limited to southern Australian waters.

Sepia brevimana Steenstrup, 1875

SEP Sep 12

Sepia brevimana Steenstrup, 1875.

Synonymy : Sepia rostrata (pars) Ferussac & Orbigny, 1848; Sepia winckworthi Adam, 1939.

FAO Names :
En - Shortclub cuttlefish
Fr - Seiche petites mains
Sp - Sepia mazicorta

Diagnostic Features : Mantle broad, its dorsal margin acuminate, strongly projecting anteriorly; posteriorly very pointed due to the long spine. Tentacular club short, with a well developed swimming keel extending proximally beyond base; dorsal protective membrane as broad as sucker-bearing surface; suckers very small, subequal; 6 to 8 suckers in oblique transverse rows.

Geographical Distribution : Indo-Malayan region, along the northern coast of the Indian Ocean, from Singapore westwards probably to the west coast of India.

Habitat and Biology : A small, demersal species, restricted to shallow, costal waters down to 30 m depth. Spawning extends almost throughout the year; in eastern Indian waters several peaks have been observed between July and February (Silas et al., 1982). Hatchlings grow to adult size in 11 to 13 months, depending on environmental temperature conditions. Off Madras, they attain 2.9 to 3.4 cm within 6 months, 5.6 to 5.8 cm at the end of 12 months and about 7.5 cm after 18 months.

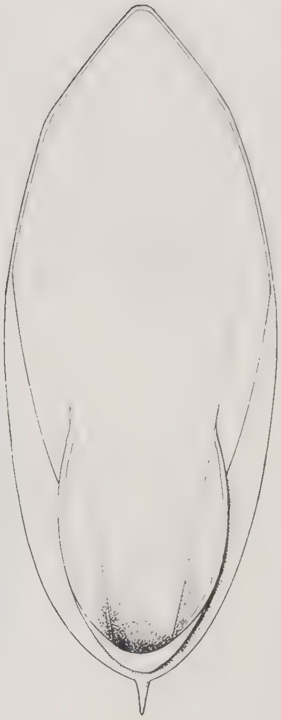
Size : Maximum mantle length 10 cm; maximum length in the Indian trawl fishery, 8.5 cm off Madras, and 9.5 cm off Waltair (northeast India). Common size ranges from about 4 to 7 cm. Length at first maturity for males is 5.6 cm off Madras and 6.2 cm off Waltair; for females, 5.9 cm and 6.3 cm, respectively.

Interest to Fisheries : This species appears as bycatch in the eastern Indian trawl fishery off Madras and Waltair, but separate catch data are not reported.

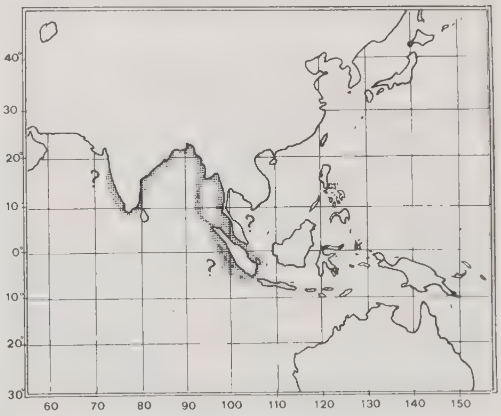
Local Names :

Literature : Silas et al. (1982, biology, India).

Remarks : The species identification from the west coast of India needs confirmation.



cuttlebone



Sepia elegans Blainville, 1827

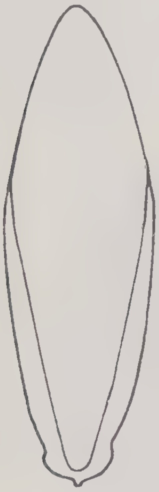
SEP Sep 3

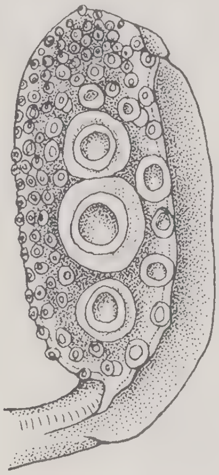
Sepia elegans Blainville, 1827, Sepia. Dict.Sci.nat., 48:284.

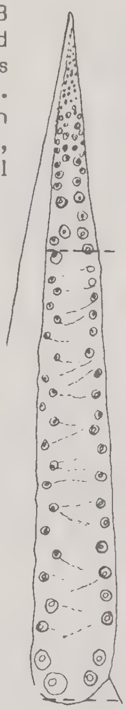
Synonymy : Sepia biserialis Blainville, 1827; Sepia rupelloria Ferrusac & Orbigny, 1835-48; Sepia italica Risso, 1854.

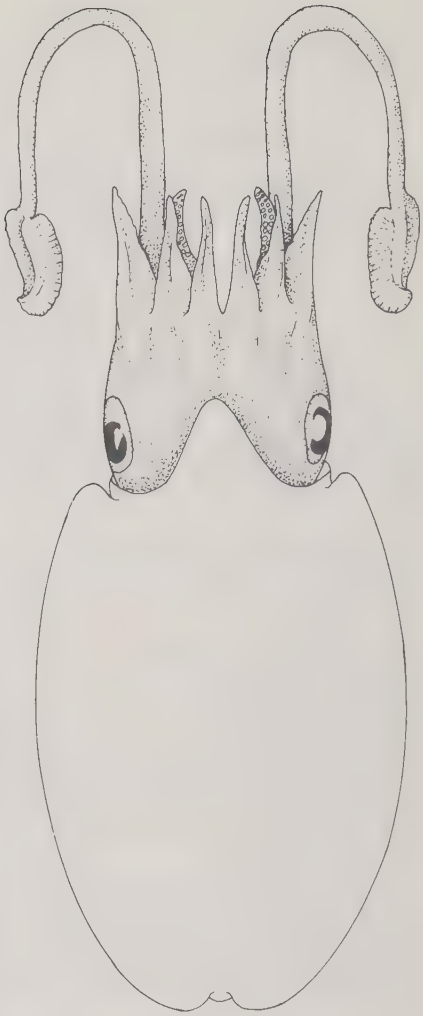
FAO Names : En - Elegant cuttlefish
Fr - Seiche élégante
Sp - Choquito sin punta

Diagnostic Features : Mantle elongate, oval-shaped, more than 2 times longer than wide, its dorsal margin projecting strongly in a sharp angle. Tentacular club short, broad, blunt distally; swimming keel extending slightly along stalk; dorsal and ventral projective membranes united at proximal base of club, extending slightly along stalk; 6 to 8 suckers in oblique, transverse rows; a few moderately enlarged suckers dorsally; 3 greatly enlarged suckers in 2nd or 3rd series (counted from dorsal side), may exceed the size of arm suckers. Left ventral arm (IV) hectocotylized for 2/3 of its length, with a few normal basal suckers followed by 9 to 11 rows of minute, widely spaced suckers arranged in a zig-zag pattern; distal third of hectocotylus with 4 oblique rows of normal suckers.

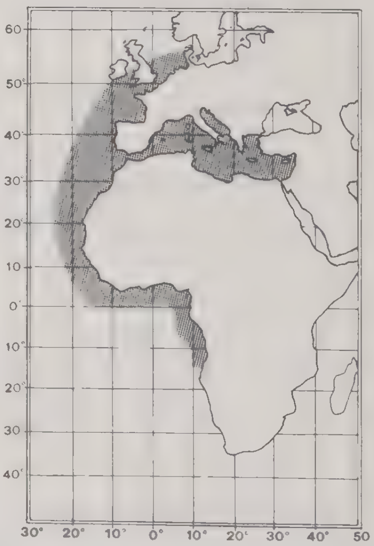

cuttlebone


tentacular club


left arm IV of male hectocotylized


dorsal view

Geographical Distribution : Eastern Atlantic from 15°S to 50°N; Mediterranean Sea including the Adriatic.



Habitat and Biology : A small demersal species with a total depth range from 30 to 430 m. In the western Mediterranean, the population begins to migrate into shallower water during the spring and by summer is concentrated on the spawning grounds in 40 to 70 m depth. In October the population begins to descend and it resides in winter at 100 to 250 m depth. Off West Africa spawning extends almost throughout the year in shallow inshore waters, with peaks in summer and autumn. Maturity is attained at about 1 year of age. Males may carry about 95 spermatophores and females about 250 eggs. Spawning occurs at temperatures of 13° to 18°C. The eggs are laid in clusters of 12 to 25 (diameter 4 mm) attached to alcyonarians (sea fans), shells, etc., on muddy bottoms. The lifespan of this species is about 1½ years. It preys on molluscs, small crustaceans and fishes.

Size : Maximum mantle length 9 cm. Males attain sexual maturity between 3 and 5 cm; females between 5 and 6 cm. In the western Mediterranean length at first maturity is 3.7 cm in males and 6.2 cm in females.

Interest to Fisheries : Taken as bycatch in Mediterranean and West African trawl fisheries. It is most abundant in about 150 m depth, hence deeper than *S. officinalis* and *S. bertheloti*. Separate statistics are not reported for this species. It is marketed fresh and frozen.

Local Names : ITALY: Seppia elengate; SPAIN: Castaño.

Literature : Mangold-Wirz (1963, biology, western Mediterranean); Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part).

Sepia elobyana Adam, 1941

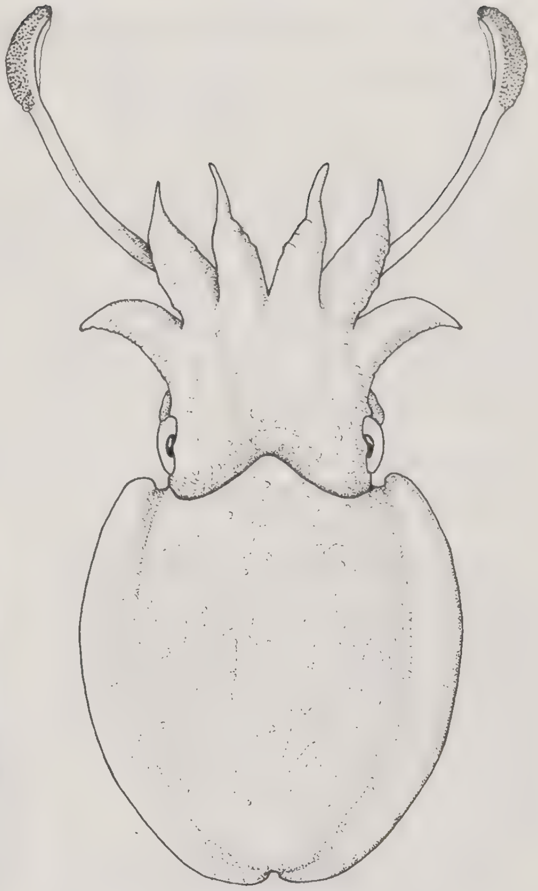
SEP Sep 13

Sepia elobyana Adam, 1941, Mém.Mus.Roy.Hist.Nat. Belg., (2)21:121.

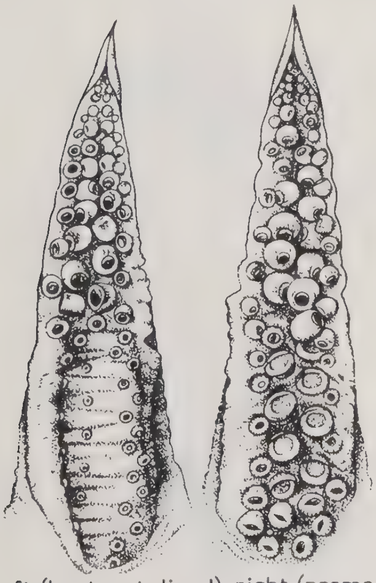
Synonymy : None.

FAO Names :
En - Guinean cuttlefish
Fr - Seiche de Guinée
Sp - Sepia guineana

Diagnostic Features : Mantle broad, length less than 2 times width, its dorsal surface with scattered tubercles and a reticulate pattern of ridges. Fins broad. Tentacular club with about 8 subequal suckers in transverse rows. Left arm IV hectocotylized in proximal half with minute, widely separated suckers on fleshy ridges; all arms attenuate, suckers of unequal sizes.

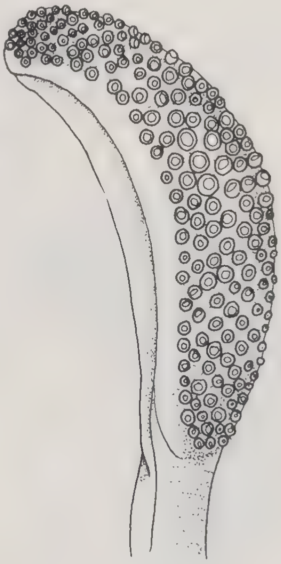


dorsal view

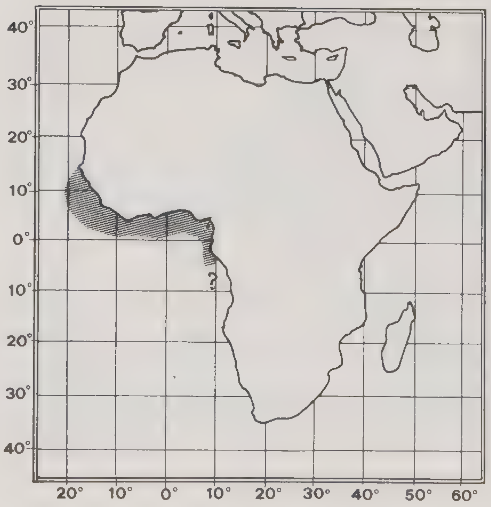


left (hectocotylized) right (normal)

pair of arms IV of male



tentacular club



Geographical Distribution : Eastern Atlantic Ocean along West African coast from Senegal to Gulf of Guinea (southern limits undetermined).

Habitat and Biology : Unknown.

Size : Maximum mantle length 6 cm.

Interest to Fisheries : Possibly taken with other cuttlefishes off West Africa, but not distinguished from similar species.

Local Names :

Sepia esculenta Hoyle, 1885

SEP Sep 14

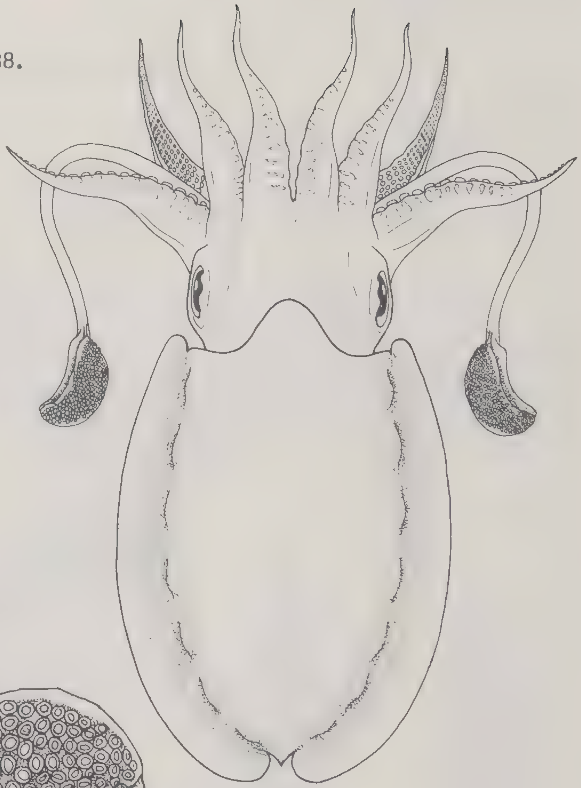
Sepia esculenta Hoyle, 1885, Ann.Mag.Nat.Hist., (5)16:188.

Synonymy : Sepia elliptica Hoyle, 1885.

FAO Names :	
En	Golden cuttlefish
Fr	Seiche dorée
Sp	Sepia dorada

Diagnostic Features : Tentacular club with 12 minute, subequal suckers in transverse rows; swimming keel extending on stalk proximal to club; protective membranes narrow, separate at base, extending along stalk as very low membranous ridges. Six or 7 elongate, membranous, fleshy papillae along base of each fin. Left arm IV hectocotylized by 5 or 6 transverse rows of small-sized suckers distal to the first 5 transverse rows of suckers. Colour: pale transverse stripes across dorsal surface of mantle; a white line along base of fins.

Geographical Distribution : Western Pacific: South China Sea (north of central Philippines) and East China Sea (Japan, excluding Hokkaido).

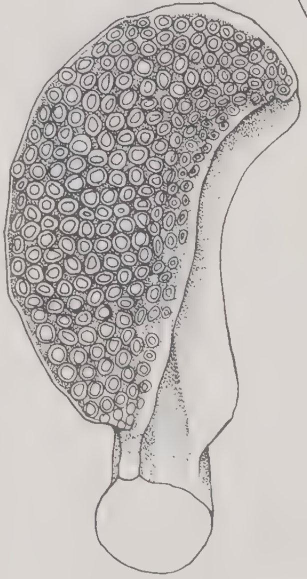


dorsal view

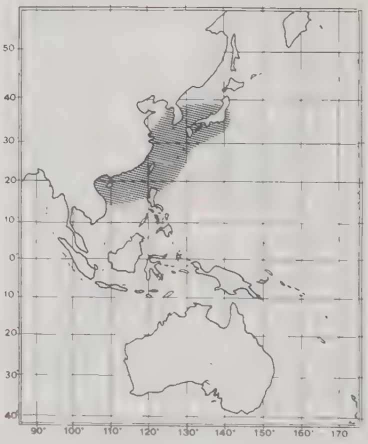
Habitat and Biology : A demersal neritic species found on sandy bottoms between 10 and 100 m depth, sometimes burrowing in the substrate. After overwintering in deeper waters, the population migrates into shallow coastal areas where it spawns when the water temperature increases. The eggs are deposited on macrophytes and other substrates.

Size : Maximum mantle length 18 cm, weight 0.6 kg.

Interest to Fisheries : The most common cuttlefish in trawl catches off western Japan. It also supports localized and subsistence fisheries in the Philippines. Around Shantung and Kiangsu provinces of China it is the dominant Sepia species landed. In Hong Kong, annual landings average about 100 tons. Caught with otter trawls, pound nets, hoop nets, and on hook-and-line. The flesh is highly appreciated as food, especially in Japan and southeast Asian countries. The Japanese domestic landings of large-sized cuttlefish are consumed as sashimi, while small-sized individuals are marketed packed and frozen, ready for cooking.



tentacular club



Local Names : CHINA: Gam woo chak, Jam mak yue; JAPAN: Hariika, Kouika, Maika, Sumiika.

Literature : Choe (1966, experimental aquaculture); Tomiyama & Hibiya (1978); Okutani (1980).

Remarks : The species has successfully been reared to market size in experiments, at growth rates well above those in natural populations (Choe, 1966).

Sepia kobiensis Hoyle, 1885

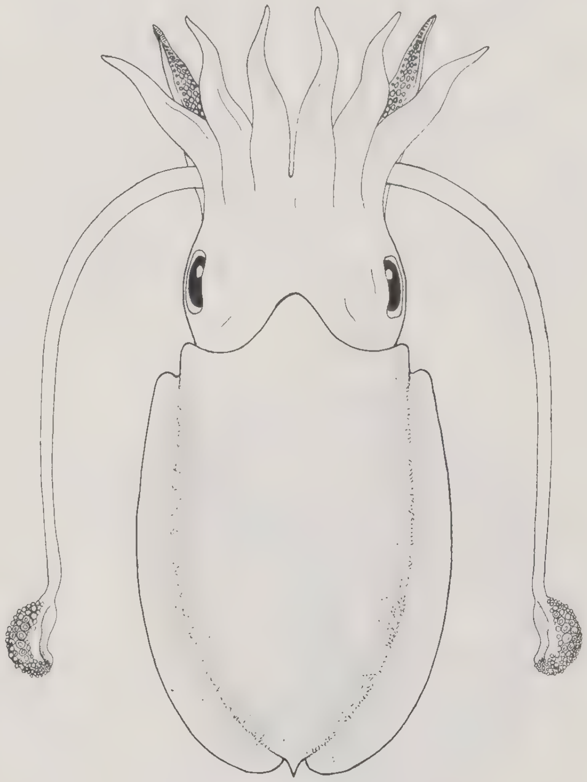
SEP Sep 15

Sepia kobiensis Hoyle, 1885, Ann.Mag.Nat.Hist., (5)16:195.

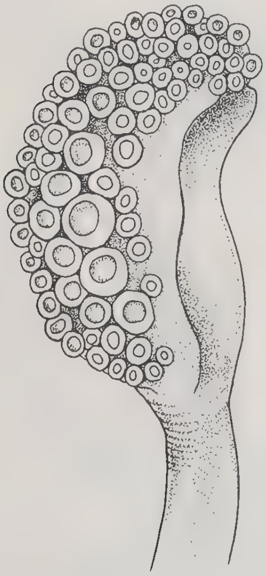
Synonymy : Sepia andreanoides Hoyle, 1885; seven subspecies - Sasaki, 1920 and 1929.

FAO Names : En - Kobi cuttlefish
Fr - Seiche kobi
Sp - Sepia kobí

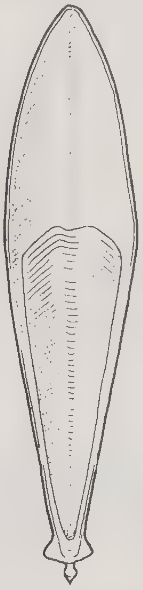
Diagnostic Features : Mantle width less than half the length. Tentacular club short, narrow; suckers small, 8 suckers in transverse rows; 5 suckers of third longitudinal row much larger than all others; swimming keel broad, extending proximally beyond base of club; dorsal protective membrane broad, half the width of sucker-bearing surface. Arms short, attenuate, subequal; arm suckers globular quadriserial, those in median rows larger than marginal ones; left arm IV hectocotylized along distal half, with suckers greatly reduced in size and the oral surface hollowed out and transversely ridged.



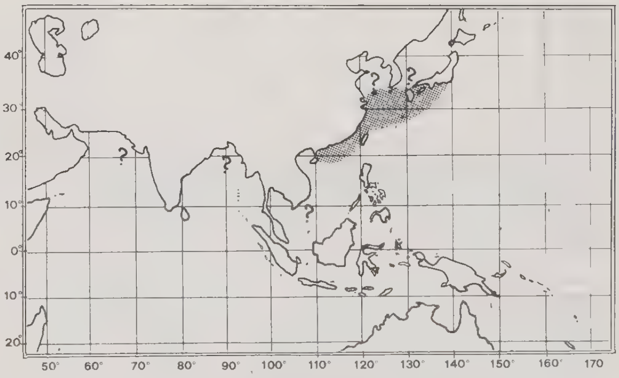
dorsal view



tentacular club



cuttlebone



Geographical Distribution : Western Pacific: South China Sea, East China Sea, Yellow Sea to southern and central Japan.

Habitat and Biology : A small demersal cuttlefish ranging to 160 m depth.

Size : Maximum mantle length 9 cm.

Interest to Fisheries : Taken as bycatch in small-scale fisheries off southern Japan and in the Inland Sea, mainly with fixed nets, trawls and beach seines, but also in small quantities between the 80 and 160 m contour in the Hong Kong area. No separate catch statistics are reported for this species.

Local Names : JAPAN: Himekouika.

Literature : Okutani (1980).

Sepia latimanus Quoy & Gaimard, 1832

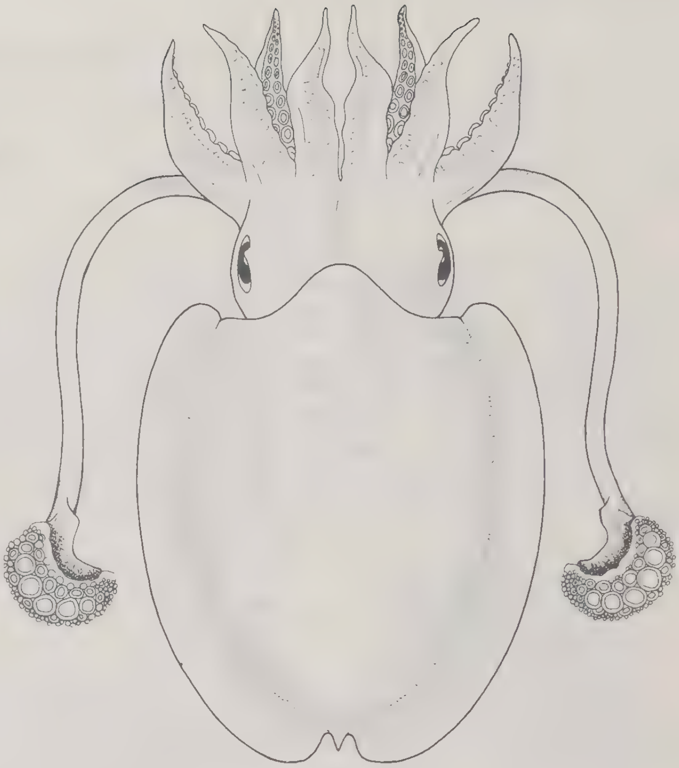
SEP Sep 16

Sepia latimanus Quoy & Gaimard, 1832, Zool.Astrolabe, 2(1):68.

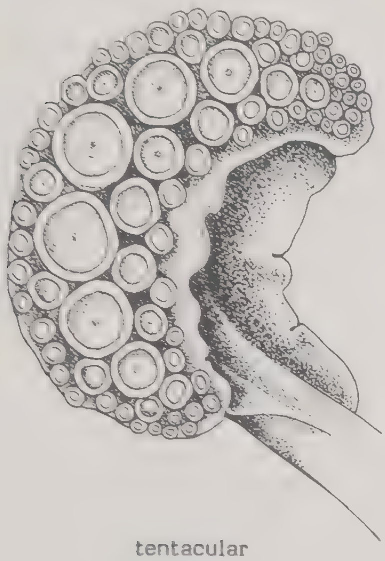
Synonymy : Sepia rappiana Ferussac, 1835; Sepia mozambica Rochebrune, 1884; Sepia hercules Pilsbry, 1894.

FAO Names :
En - Broadclub cuttlefish
Fr - Seiche grandes mains
Sp - Sepia mazuda

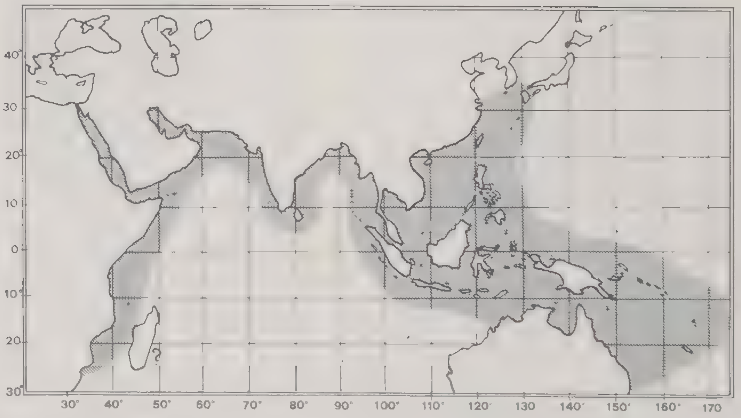
Diagnostic Features : Tentacular clubs half-moon-shaped, their protective membranes fused at base, completely surrounding sucker-bearing surface; a deep cleft or groove between swimming keel and dorsal protective membrane nearly separates sucker-bearing area from stalk; swimming heel extending proximally just beyond base of club; 5 or 6 suckers in transverse rows, a few median ones enlarged.



dorsal view



tentacular club



Geographical Distribution : Indo-Pacific: from southern Mozambique, throughout the periphery of the Indian Ocean, Coral Sea, Melanesian Islands, South China Sea, Philippine Sea and East China Sea to southern Japan.

Habitat and Biology : A shallow-water species inhabiting tropical coral reefs to depths of at least 30 m. Mating occurs on the west coast of Guam and off Okinawa in shallow waters (30 m depth) during January through May and the eggs hatch in 38 to 40 days.

Size : Maximum mantle length 50 cm.

Interest to Fisheries : This species supports local fisheries in western Japan and the Philippines. It is caught with jigs, handlines, setnets and spears. Common as bycatch in southeast Asian trawl fisheries. Separate statistics are not reported for this species.

Local Names : JAPAN: Kobushime, Kubushime.

Literature : Okutani (1980); Chikuni (in press, fishery potential).

Sepia longipes Sasaki, 1914

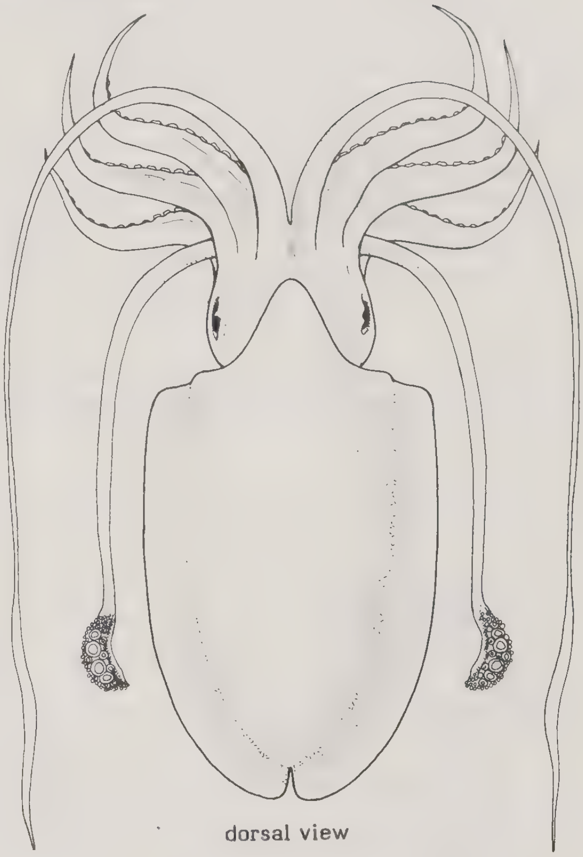
SEP Sep 17

Sepia (Doratosepior) longipes Sasaki, 1914, Annot.Zool.Jap., 8(5):619.

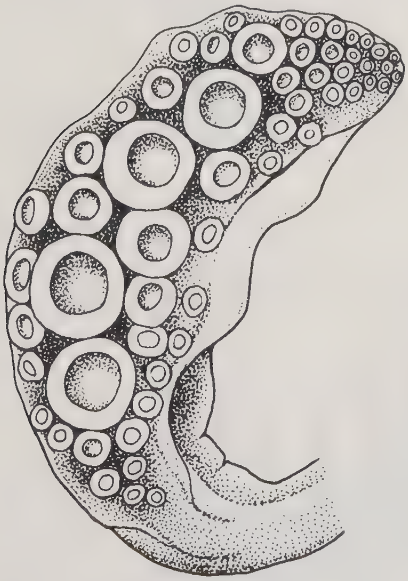
Synonymy : None.

FAO Names : En - Longarm cuttlefish
Fr - Seiche pieuvre
Sp - Sepia brazolargo

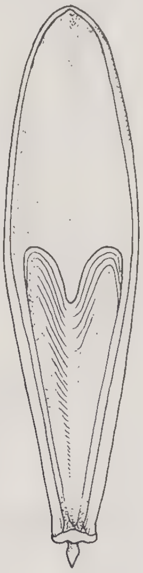
Diagnostic Features : Anterior dorsal mantle extending far anteriorly. Tentacular club crescent-shaped, expanded; up to 8 suckers in transverse rows, 4 medial suckers considerably enlarged. Arms I of males greatly elongate - 2 times longer than mantle, somewhat thickened distally, bordered with a broad, trabeculate protective membrane; both arms IV hectocotylized in their distal 2/5 - the left by longitudinal furrows and ridges with rudimentary quadriserial suckers, the right by slightly rudimentary suckers.



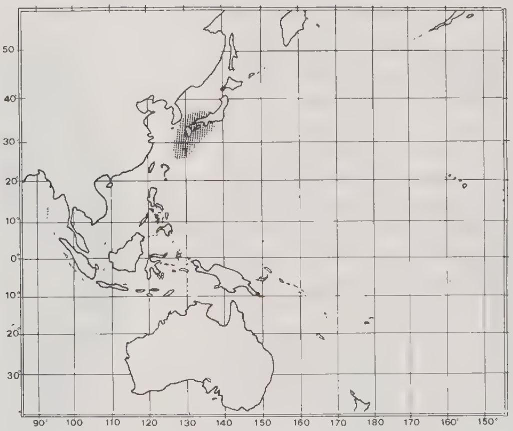
dorsal view



tentacular club



cuttlebone



Geographical Distribution : Southern Japan.

Habitat and Biology : A neritic demersal species.

Size : Maximum mantle length 20 cm.

Interest to Fisheries : Undetermined.

Local Names :

Sepia lorigera Wülker, 1910

SEP Sep 18

Sepia lorigera Wülker, 1910, Abh.Bayer.Akad.Wiss., 3(suppl.1):12.

Synonymy : None.

FAO Names :
En - Spider cuttlefish
Fr - Seiche araignée
Sp - Sepia loriga

Diagnostic Features : Dorsal part of mantle extending into a prominent anterior lobe. Tentacular club expanded, crescent-shaped, with 8 suckers of greatly unequal size in transverse rows, 4 medial suckers greatly enlarged. Arms I of males greatly elongate - 2 times longer than mantle, whip-like, attenuate, with tips flared by a broad protective membrane; left arm IV hectotylized in its distal third by rudimentary suckers on swollen bases along transverse ridges.

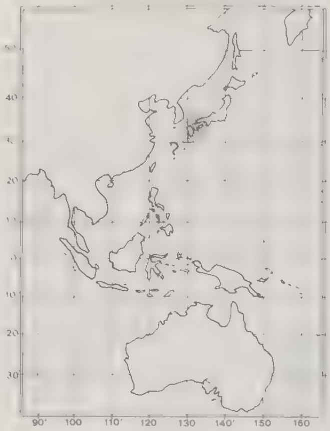
Geographical Distribution : Western Pacific: southwestern Japan, Inland Sea.

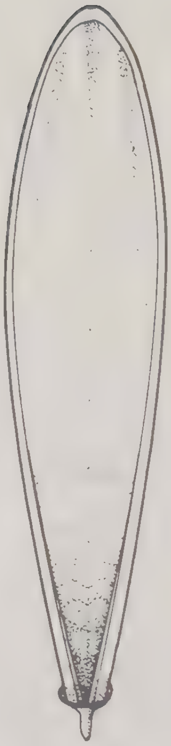
Habitat and Biology : A neritic, demersal species.

Size : Maximum mantle length 25 cm.

Interest to Fisheries : Fished in southwestern Japan, but no detailed information is available on the catch.

Local Names :





cuttlebone

Sepia lycidas Gray, 1849

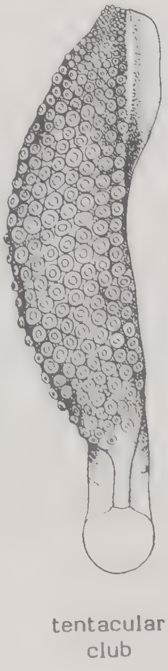
SEP Sep 19

Sepia lycidas Gray, 1849, Cat.Moll.Brit.Mus., 103.

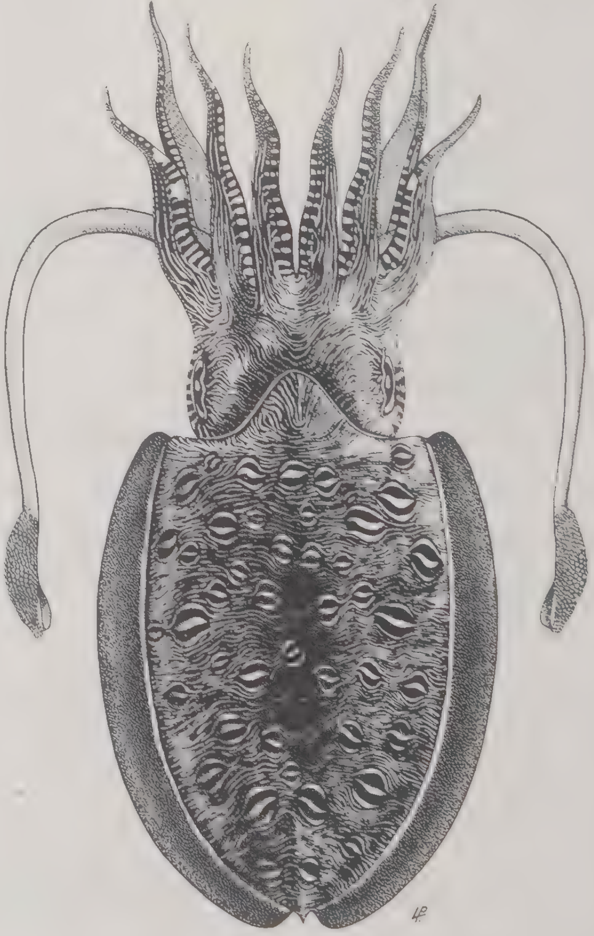
Synonymy : Sepia subaculeata Sasaki, 1914.

FAO Names :
En - Kisslip cuttlefish
Fr - Seiche baisers
Sp - Sepia labiada

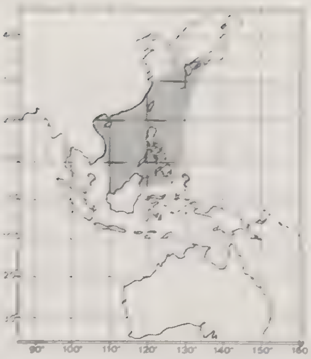
Diagnostic Features : Tentacular club with well-developed swimming keel extending nearly to base of club; outer keel along tentacular stalk extends along club but does not connect with swimming keel; protective membranes extending, without meeting, along entire length of stalk as membraneous ridges; 8 subequal suckers in transverse rows. Colour: dorsal part of mantle with vivid oval eye-like or lip-shaped markings; a white line along bases of fins.



tentacular club



dorsal view



Geographical Distribution : Western Pacific: South China Sea, Philippine Sea and southwestern Japan.

Habitat and Biology : A neritic demersal species ranging in depths from 15 to about 100 m. In the South China Sea, it is abundant between 60 and 100 m depth during the prespawning period (November to February), but migrates inshore to spawn in depths of 15 to 30 m from March through May.

Size : Maximum mantle length 38 cm, and weight 5 kg.

Interest to Fisheries : The secondmost important commercial cuttlefish in Japan (East China Sea) and Hong Kong. Caught as bycatch in trawls and with setnets and jigs, or using live cuttlefish as lures during the spawning season, or hook baited with live prawns or crabs in other seasons. The flesh of the mantle is thick and tasty, and therefore greatly esteemed.

Local Names : CHINA: Fa gai na, Mak gung, Yi muk woo chak; JAPAN: Gitchyoika, Kaminariika, Kobuika, Maruichi, Mongouika.

Literature : Tomiyama & Hibiya (1978).

Remarks : The species has been reared successfully in aquaculture experiments (Choe, 1966; under the name of Sepia subaculeata).

Sepia madokai Adam, 1939

SEP Sep 20

Sepia madokai Adam, 1939, Results Esped. Indes Neerl.Orient., 55c:77.

Synonymy : Sepia robsoni Sasaki, 1929 (non robsoni Massy, 1927).

FAO Names : En - Madokai's cuttlefish
Fr - Seiche madokai
Sp - Sepia madokai

Diagnostic Features : Mantle length less than 2 times the width. Tentacular club expanded, flattened crescent-shaped; 16 very small, subequal suckers, in transverse rows. Left arm IV hectocotylized in middle third by rudimentary suckers, those of the dorsal 2 rows much more reduced.

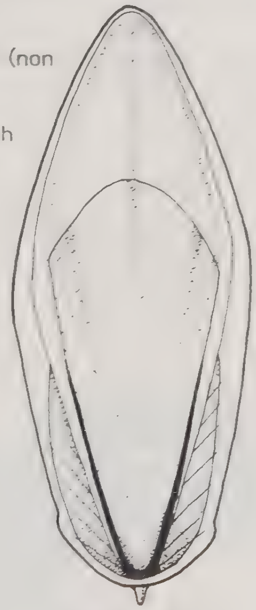
Geographical Distribution : Western Pacific: southwestern Japan.

Habitat and Biology : A demersal species most common in bays. Its exact depth range unknown.

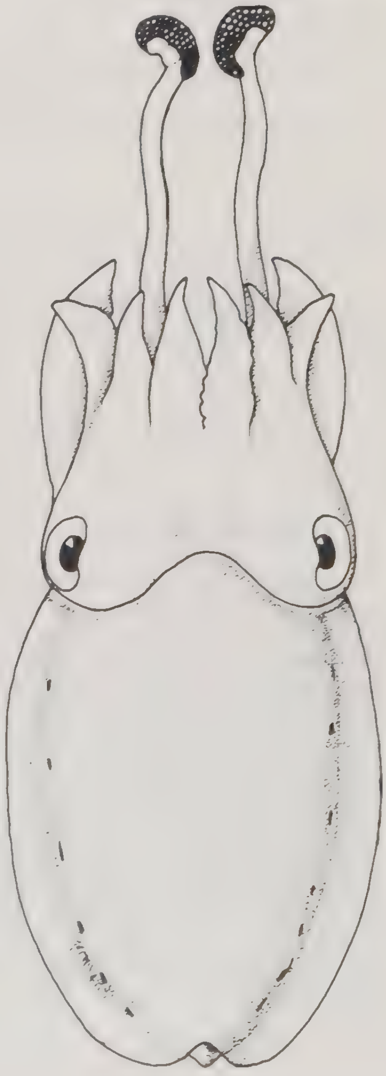
Size : Maximum mantle length 10 cm.

Interest to Fisheries : Common in Inland Sea area, where it is fished with bottom drift nets and trawls, but is of limited commercial value because of its small size.

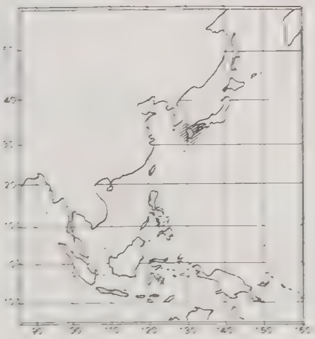
Local Names :



cuttlebone



dorsal view



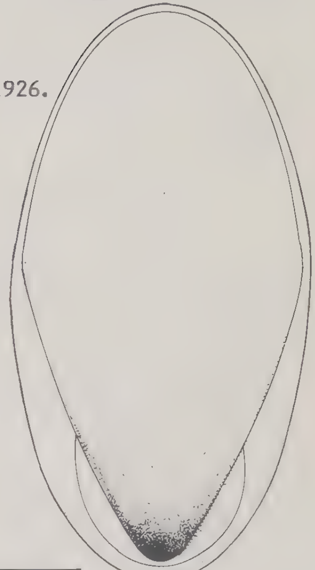
Sepia mestus Gray, 1849

SEP Sep 21

Sepia mestus Gray, 1849, Cat.Moll.Brit.Mus., 108.

Synonymy : Ascarosepion verreauxi Rochebrune, 1884; Solitosepia liliana Iredale, 1926.

FAO Names : En - Reaper cuttlefish
Fr - Seiche moisson
Sp - Sepia segadora



cuttlebone

Diagnostic Features : Tentacular clubs expanded, with a broad swimming keel extending proximally along tentacular stalk for half the length of the club; protective membranes remain separated at base of clubs; club suckers small, subequal, 8 suckers arranged in transverse rows, those in the middle of the 3rd longitudinal row slightly enlarged. Shell broad, oval.

Geographical Distribution : Southwest Pacific: eastern Australia, approximately 39°S to 20°S.

Habitat and Biology : A neritic demersal species; depth range uncertain.

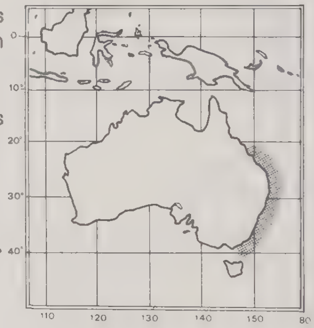
Size : Maximum mantle length 14 cm.

Interest to Fisheries : So far there are no directed fisheries for this species, but probably it enters the artisanal cuttlefish catches in southeastern Australia.

Local Names : AUSTRALIA: Common New South Wales cuttlefish.

Literature : Okutani (1977, fishery resources).

Remarks : Published records refer only to stranded cuttlebones.



Sepia murrayi Adam & Rees, 1966

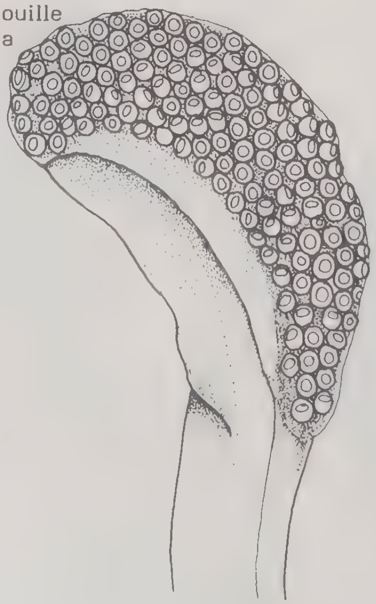
SEP Sep 22

Sepia murrayi Adam & Rees, 1966, Sci.Rep.John Murray Exped., 1933-34, 11(1):63.

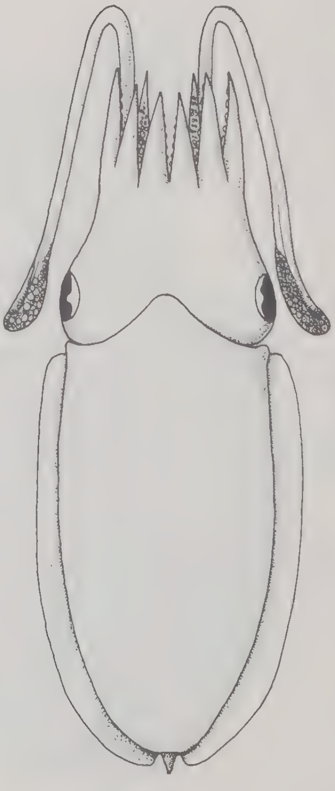
Synonymy : None.

FAO Names : En - Frog cuttlefish
Fr - Seiche grenouille
Sp - Sepia ranuda

Diagnostic Features : Mantle elongate, oval. Fins broad, extending beyond posterior tip of mantle. Tentacular club short, narrow, crescent-shaped; a strong swimming keel extends slightly beyond proximal base of club; dorsal protective membrane nearly as broad as sucker-bearing surface; both protective membranes remain separate and extend along stalk as low ridges; 5-6 minute, subequal suckers in transverse rows. Arms compressed with low swimming membranes; tips bluntly pointed, protective membranes wider and folded over suckers at tips; suckers biserial on arms I and tips of all arms.



tentacular club



dorsal view

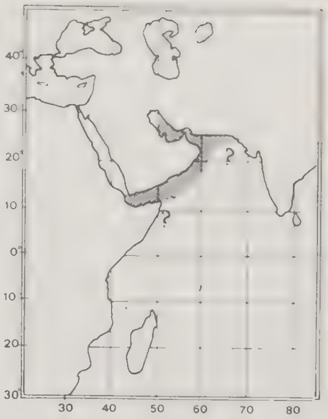
Geographical Distribution : Indian Ocean: Gulf of Aden and western Gulf of Oman.

Habitat and Biology : A neritic demersal species; depth range undetermined (the only record is 106 m).

Size : Maximum mantle length 4.5 cm.

Interest to Fisheries : Reported from a bottom trawl resource survey in the Gulf of Aden; its relevance to artisanal or industrial fisheries is undetermined.

Local Names :



Sepia officinalis Linnaeus, 1758

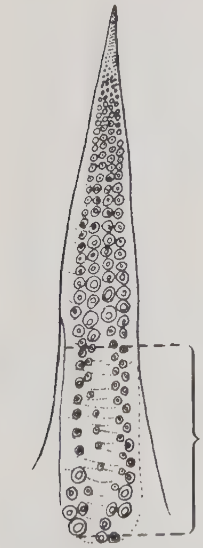
SEP Sep 1

Sepia officinalis Linnaeus, 1758, *Syst.Nat.*, ed. 10:658.

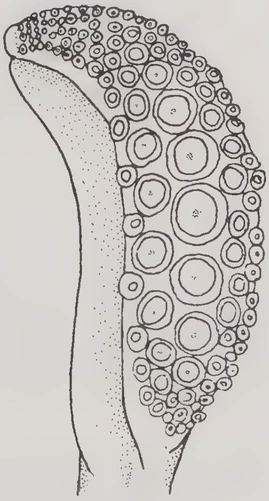
Synonymy : None.

FAO Names : En - Common cuttlefish
Fr - Seiche commune
Sp - Sepia común

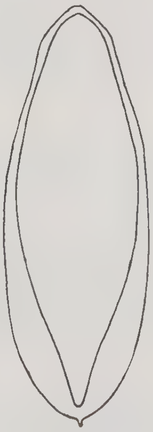
Diagnostic Features : Tentacular club with 5 or 6 suckers in each transverse row, the median ones moderately enlarged; swimming keel not extending proximally beyond base of club. Left arm IV hectocotylized by reduction in size of suckers in proximal 5 to 8 horizontal rows (*S. officinalis* type) or in proximal 8 to 13 rows (*S. hierredda* type); dorsal protective membrane of normal width (*S. officinalis* type) or little developed (*S. hierredda* type); cuttlebone anteriorly and posteriorly rounded (not acuminate), with parallel sides and a weak spine visible in juveniles, but embedded in chitin in adults, the striated zone not extending past midpoint of length (*S. officinalis* type), cuttlebone acuminate at both ends, with a spine also in adults and striations sometimes extending past midpoint of length (*S. hierredda* type).



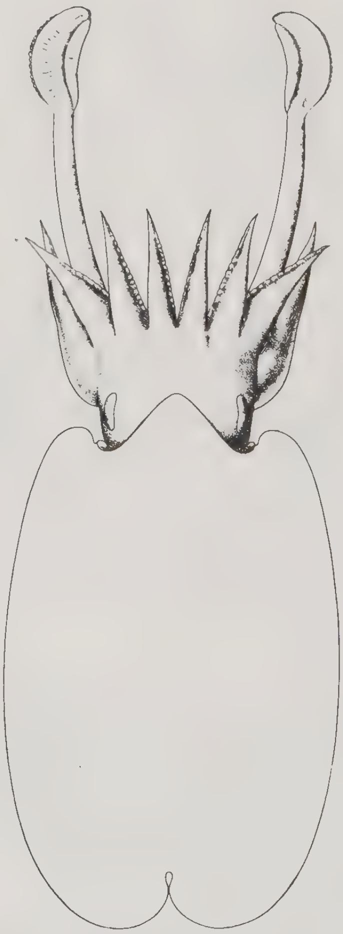
left arm IV of male hectocotylized



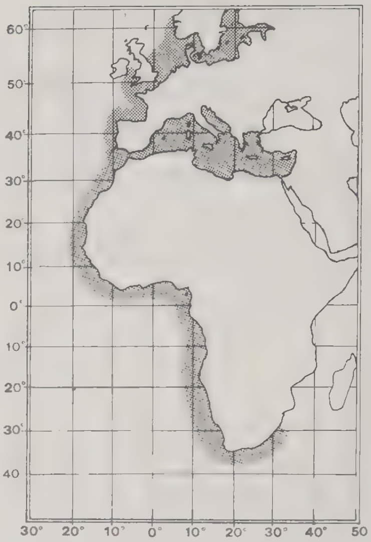
tentacular club



cuttlebone



dorsal view



Geographical Distribution : Eastern Atlantic: from the Baltic and North Seas to South Africa; Mediterranean Sea.

Habitat and Biology : A demersal, neritic species occurring predominantly on sandy to muddy bottoms from the coastline to about 200 m depth, but most abundant in the upper 100 m; larger individuals are encountered in the deeper part of the range. Seasonal migrations (mainly vertical) have been shown to occur in all stocks. For the population off Senegal, Bakhaykho & Drammeh (1982) suggest a seasonal north-south, and an offshore-inshore migration pattern. In the western Mediterranean, in early spring, large individuals leave the deeper water, where they spend the winter, to migrate into shallower water (males precede females by about a week). This group is followed by a succession of smaller cuttlefish arriving in shallow waters throughout the summer. In autumn the gradual descent beings. Spawning occurs in shallow waters, throughout the year, with peaks at water temperatures from 13^{o} to 15^{o}C: in the western Mediterranean, between April and July, off Senegal and on the Sahara Banks between January and April (primarily big adults); there is a second minor spawning peak of medium and small-sized individuals in late summer and early autumn.

Males may carry up to 1 400 spermatophores, females between 150 and 4 000 eggs, depending on their size. Eggs measure from 8 to 10 mm in diameter and are attached in grape-like clusters to seaweeds, debris, shells and other substrates. They hatch after 30 to 90 days depending on temperature (21.5^{o} to 15^{o}C, respectively). The total length of hatchlings is 7 or 8 mm. Growth rate varies directly with temperature and inversely with size (Pascual, 1978). Larvae hatched in early summer from the spring brood usually participate in the autumn spawning of the following year, while those from the autumn brood spawn in spring in their second year of life. Thus, the two cycles alternate. Males predominate in the adult phase because of massive postspawning mortality among large females.

Food consists of small molluscs, crabs, shrimps, other cuttlefishes, and juvenile demersal fishes. Cannibalism is common and has been interpreted as "strategy" to overcome temporary shortage of adequately sized prey (Caddy, 1979). Daily feeding rates of 10 to 30% of body weight in juveniles do not seem unlikely in view of the high growth rate and the relatively short lifespan (up to 2 years in the fishery). Predators of common cuttlefish include sharks, sparids and other demersal fishes and cuttlefishes.

Size : Maximum mantle length 45 cm, weight up to 4 kg in temperate waters, but only little more than 30 cm and 2 kg in subtropical seas. Common sizes in the West Saharan fisheries range between 15 and 25 cm. In that area, length at first maturity is 13.5 cm mantle length in females, and between 12 and 14 cm in males. Off Tunisia, length at first maturity is 12 cm in females, and 10 cm in males.

Interest to Fisheries : An important commercial resource throughout its range. World catches attributed to this species varied between 8 500 and 14 000 metric tons in recent years. The catch reported for 1981 totalled 12 800 metric tons, taken almost exclusively by Italy in the Mediterranean (Fishing Area 37) (FAO, 1983). Prominent catches of unidentified cuttlefishes (*Sepia* spp. and *Sepiola* spp.), most of which are believed to be *S. officinalis*, also are taken off West Africa (Fishing Area 34). In 1981, these catches amounted to about 29 100 metric tons showing a slight decrease against previous years. For many years Spain has taken the largest catches in this area. The finfish discarded by Spanish cuttlefish trawlers was estimated at approximately 63% in 1976 and included more than 90 species categories, primarily sparids (*Pagellus erythrinus* and *P. acarne*), jack mackerels (*Trachurus* spp.), flatfishes, electric rays (*Torpedo* spp.), and weevers (*Trachinus* spp.) (Bravo de Laguna, Fernandez & Santana, 1976). While the Japanese share in the West African cuttlefish catches went down drastically, Moroccan participation in this fishery, which started only in 1980, is steadily increasing. Senegalese catches remained relatively stable over the last 5 years (FAO, 1983). It is suspected, that the overall effort exceeds the optimum level and that present catch levels could be maintained or even increased with reduced effort (Caddy, 1981).

In the industrial fisheries, common cuttlefish is primarily trawled, either as a target species or as bycatch to demersal finfishes. On the other hand, the artisanal fisheries utilize a great variety of highly selective gear, such as spears, pots and traps, often combined with the use of light. One particular fishing method used in calm, transparent waters consists of luring the males with a live female attached to a thin line. Once the male has grabbed the female, both are pulled up, the male is detached, and the female lowered again. The live female, may be substituted with a mirror which causes the male to mistake his own image for the female. Common cuttlefish is usually marketed fresh and frozen, and is a highly appreciated food item, particularly in Japan, Republic of Korea, Italy and Spain. Aquaculture has been tried experimentally and also appears promising for large-scale ventures.

Local Names : ALGERIA: Choubai, Chouebi, Seiba, Seich, Sepia, Seppio; BULGARIA: Sepija; CYPRUS: Soupia; EGYPT: Sobbeit; FINLAND: Mustekala, Sepia; FRANCE: Casseron, Chakod, Chibia, Margade, Seiche; Corsica: Seppia; GERMANY (FR): Gemeiner Tintenfisch, Sepie; GREECE: Soupia; ISRAEL: Dyonon refui; ITALY: Pruppusiccia, Scarpetta, Scarpitta, Scarpitelle (juveniles), Secce, Seccetella, Sepa, Sepia imperiale, Seppa, Seppia, Siccia; JAPAN: Mongoika, Yoroppa kouika; LEBANON: Sabbidije; LIBYA: Shoubia; MALTA: Sicca; MONACO: Supia; MOROCCO: Chubei, Seiche; NETHERLANDS: Gewone Inktvis, Zeekat; PORTUGAL:

Chêco, Chôco; Madeira: Choco; ROMANIA: Sepia; SENEGAL: Seiche; SPAIN: Aluda, Castañuela, Choco, Chocón, Coca, Jibia, Jibión, Luda, Rellena, Relleno, Sipia, Sipionet; TUNISIA: Choubei, Chouebi, Seche, Sibia, Sipia, Soubia; TURKEY: Sübye; UK: Cuttlefish; USSR: Kora katitza; YUGOSLAVIA: Sipa.

Literature : Mangold-Wirz (1963, biology, western Mediterranean); Fischer (1973, Species Identification Sheets, Mediterranean and Black Sea, fishing area 37); Pascual (1978, growth and food conversion in aquarium conditions); Hatanaka (1979a, spawning seasion northwest African stocks); Caddy (1981, ecological role and management consideration in northwest African fisheries); Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part); Bakhaykho & Drammeh (1982, biology of Senegalese stocks); Fisheries Committee for the Eastern Central Átlantic (CECAF) (1982, stock assessment); Conseil général des pêches pour la Méditerranée (CGPM) (1982, stock parameter for the Mediterranean).

Remarks : Several subspecies have been named for various populations throughout the very broad latitudinal range of this species, but it seems best to refer here only to the species until their systematics and distributions are better understood. The species has been successfully reared in aquaculture experiments of medium scale (Minervini, Sequi & Barbato, 1982).

Sepia omani Adam & Rees, 1966

SEP Sep 23

Sepia omani Adam & Rees, 1966, Sci.Rep.John Murray Exped., 1933-34, 11(1):92.

Synonymy : None.

FAO Names : En - Oman cuttlefish
Fr - Seiche d'Oman
Sp - Sepia omaní

Diagnostic Features : Mantle broad, extending anteriorly in a lobe beyond mid-point of eyes. Fins emerging close to mantle margin. Tentacular club short, broad; swimming keel well developed and slightly longer than club; a deep cleft or groove nearly separates sucker-bearing surface from tentacular stalk; protective membranes narrow, separated at base of club, not continuing along stalk; 8 suckers arranged in very oblique, transverse rows, 4 or 5 in middle of third longitudinal row very greatly enlarged, globular. Left arm IV hectocotylized in its middle portion with greatly crowded dorsal and ventral rows on suckers leaving the central region devoid of suckers but transversely ridged.

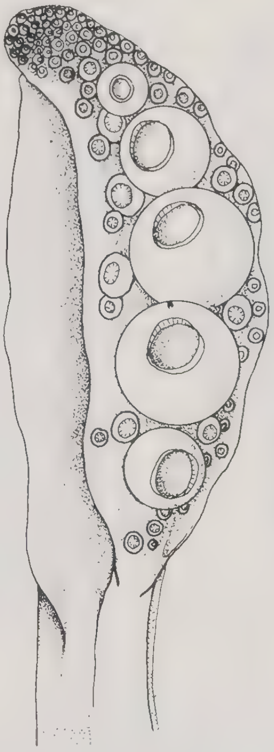
Geographical Distribution : Indian Ocean: western Gulf of Oman.

Habitat and Biology : A neritic demersal species; depth range undetermined (the only record is from 201 m depth).

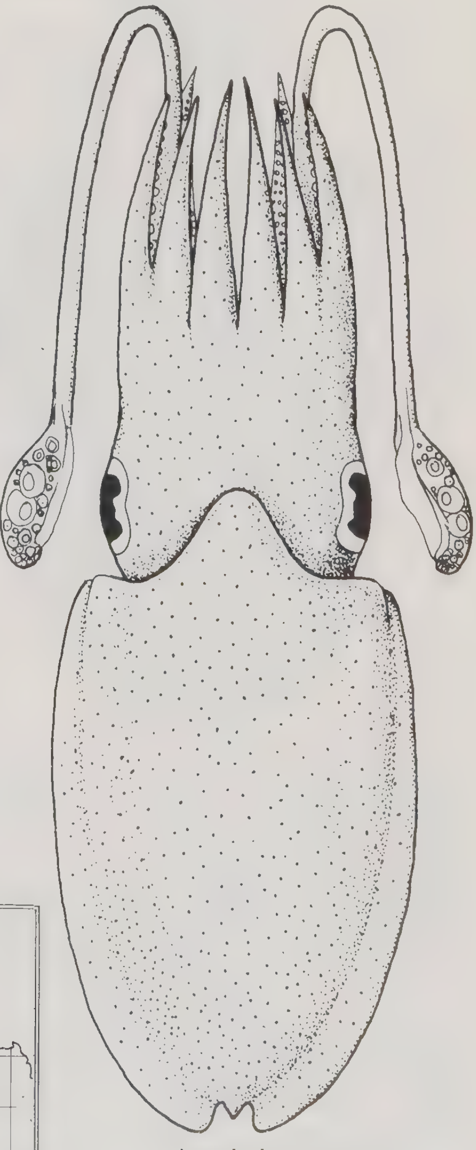
Size : Maximum mantle length 7 cm.

Interest to Fisheries : No information.

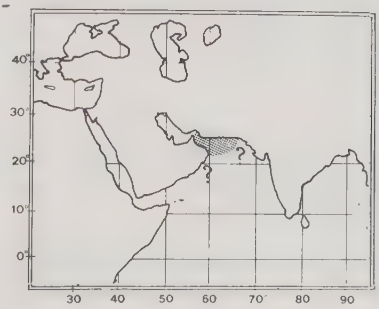
Local Names :



tentacular club



dorsal view



Sepia orbignyana Ferussac, 1826

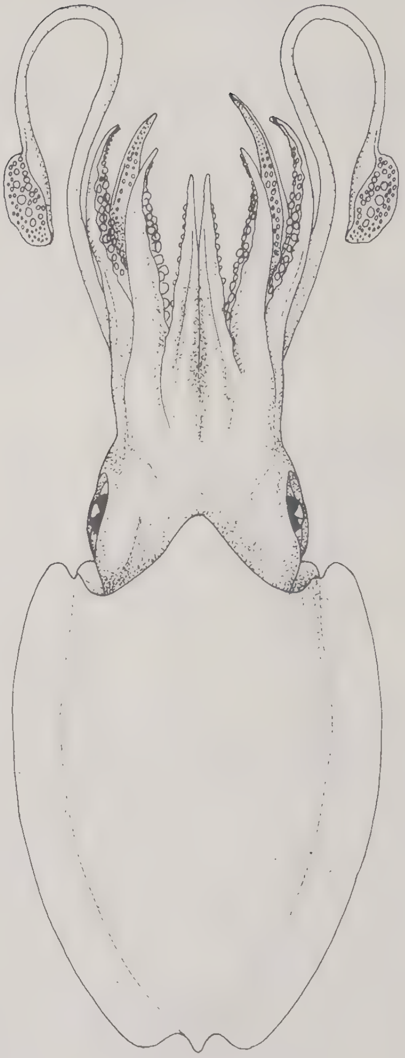
SEP Sep 4

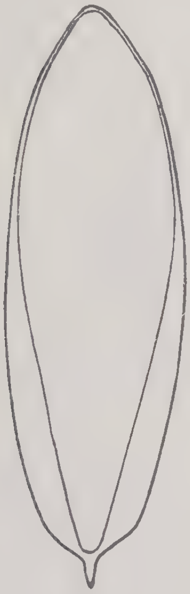
Sepia orbignyana Ferussac, 1826, Ann.Sci.nat., 7:156.

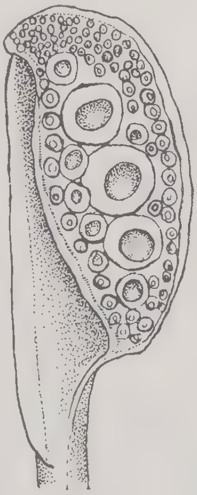
Synonymy : Sepia rubens Philippi, 1844; Acanthosepion enoplon Rochebrune, 1884.

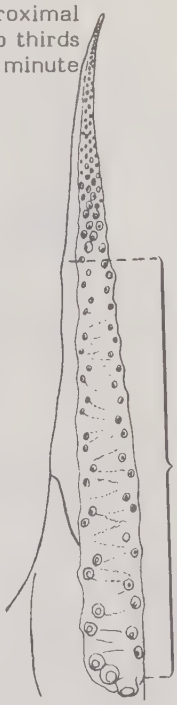
FAO Names : En - Pink cuttlefish
Fr - Seiche rosée
Sp - Choquito con punta

Diagnostic Features : Width of cuttlebone equal to one third of its length, dorsal surface rose or orange coloured with a faint median groove. Fins extend full length of mantle, not uniting posteriorly. Tentacular clubs with 5 suckers across the club, the median longitudinal row with 3 greatly and 2 moderately enlarged suckers; swimming keel extends proximally beyond base of club. Left arm IV hectocotylized with proximal dorsal and ventral suckers forming zig-zag series for two thirds of length, followed by a dozen transverse rows of 4 minute suckers to tip of arm. Colour: mottled.

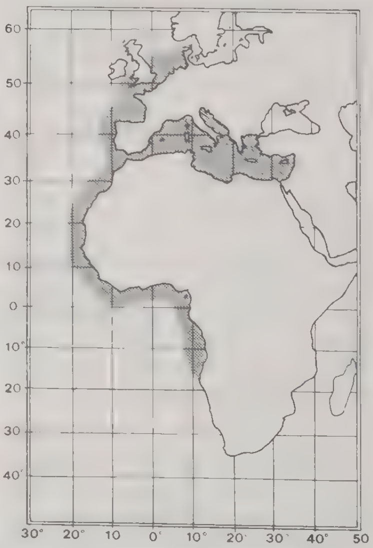

dorsal view


cuttlebone


tentacular club


left arm IV of male hectocotylized

Geographical Distribution : Eastern Atlantic: from 17°S to 55°N; Mediterranean Sea.



Habitat and Biology : A nektonic species occurring over muddy and detritus-rich continental shelf and slope areas in 50 to 450 m depth, but most abundant between 80 and 150 m, throughout the year. No onshore spawning migrations have been reported. Spawning occurs at temperatures of 13° to 16°C. In the western Mediterranean and off northwest Africa, the spawning period extends from early summer to autumn. Mature males, aged 6 or 7 months, carry about 100 spermatophores; females of 9 or 10 months, some 400 eggs. Egg diameter increases with the size of the females. The eggs (7 to 8.5 mm diameter) are laid in clusters of 30 to 40 and attached to sponges on muddy bottoms.

Size : Maximum mantle length 12 cm; in West African populations, males reach sexual maturity at about 4 or 5 cm mantle length, females at 7 cm; in those in the western Mediterranean length at first maturity is almost 5 cm in males and about 7.8 cm in females.

Interest to Fisheries : One of the species regularly exploited by western Mediterranean and Saharan-West African trawl fisheries. Separate statistics however, are not reported for this species.

Local Names: ITALY: Seppia pizzuta; SPAIN: Chopito.

Literature: Mangold-Wirz (1963, biology, western Mediterranean); Okutani (1980); Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part).

Sepia pharaonis Ehrenberg, 1831

SEP Sep 6

Sepia pharaonis Ehrenberg, 1831, Symbolae Phys., Moll., unpag.

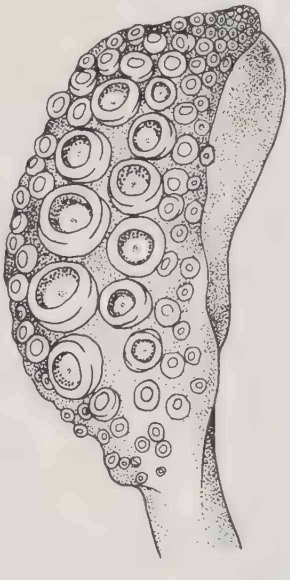
Synonymy: Sepia rouxi Orbigny, 1841; Sepia formosana Berry, 1912; Sepia formosana Sasaki, 1929; Sepia tigris Sasaki, 1929.

FAO Names: En - Pharaoh cuttlefish
Fr - Seiche pharaon
Sp - Sepia faraónica

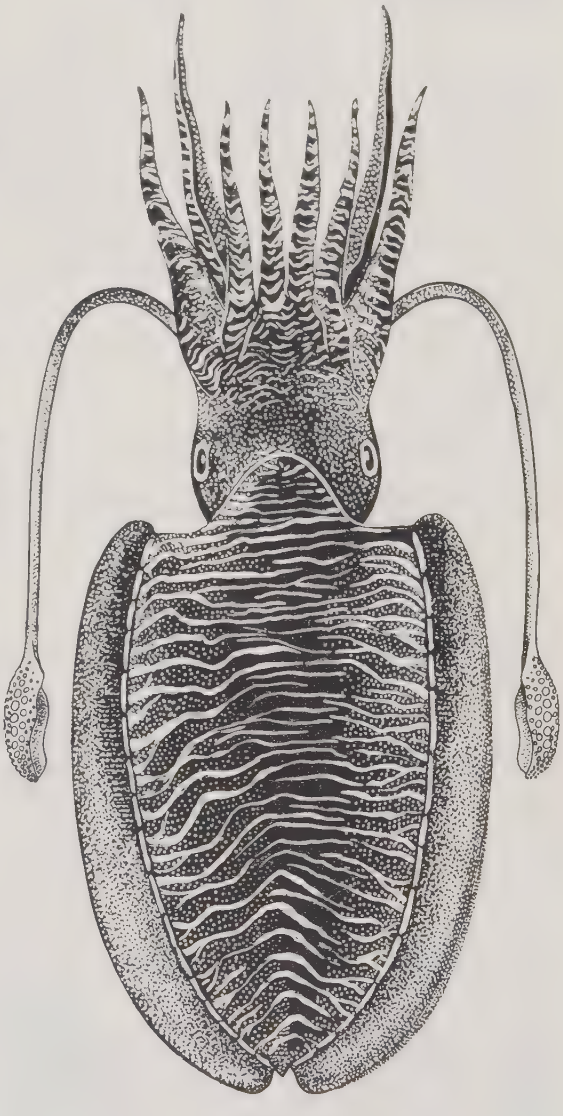
Diagnostic Features: Mantle broad. Fins wide, nearly as long as mantle. Tentacular clubs moderately long; protective membranes not meeting at base; 8 suckers in transverse rows with 5 or 6 median ones (3rd and 4th in the series) quite enlarged. Left arm IV hectocotylized: basal 12 quadriserial rows normal, next 10 rows with ventral suckers (2 rows) normal but those in dorsal 2 rows minute and separated from ventral rows by a fleshy, transversely grooved ridge. Colour: a vivid transverse tiger-stripe pattern (especially in males) on dorsal mantle and head; a narrow, light, interrupted line along bases of fins.

Geographical Distribution: Indo-Pacific: Red Sea, Arabian Sea to South China Sea, East China Sea and northern and northwestern Australia.

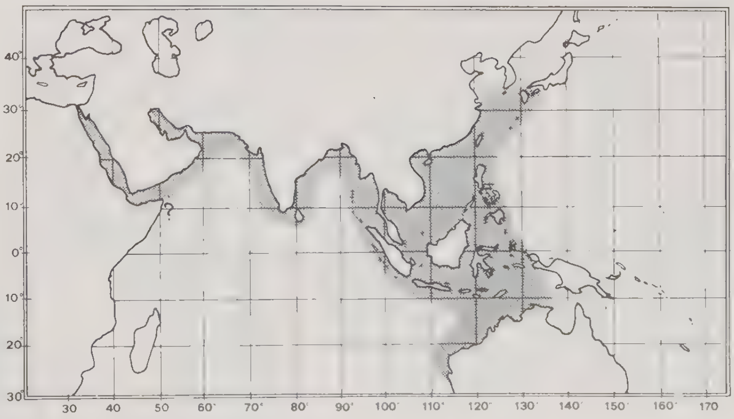
Habitat and Biology: A neritic, demersal species occurring from the coastline to about 110 m depth, but more abundant in the upper 40 m, particularly during the reproductive season, when it migrates shoreward and aggregates in shallow waters. Spawning takes place at water temperatures ranging from 18° to 24°C, from March to May around Hong Kong, but extends almost throughout the year around India, with peaks from September to December and April to June on the east coast, and from October to December and March to April on the west coast (Silas et al., 1982). Peak spawning in the Red Sea extends from August through October, with the females participating as one-year olds and the males mostly as two-year olds (Sanders, 1981). Fertility increases with size. The eggs are laid in clusters and attached to plants, shells and other substrates.



tentacular club



dorsal view



On the Indian east coast, hatchlings attain mantle lengths of up to 10 cm after 6 months, almost 17 cm after 12 months, and about 20 cm after 16 months, while on the west coast they grow to 14 cm in 6 months, 21 cm in 12 months, 26 cm in 18 months and almost 30 cm in 2 years. Longevity is estimated at about 2 years on the east coast and 3 years on the west coast, with males living longer than females.

Food includes crustaceans and a variety of small demersal fishes. Cannibalism is not exceptional. The main predators of this species are demersal fishes.

Size : Maximum mantle length 43 cm for males and 33 cm for females off the People's Democratic Republic of Yemen; more southward the maximum size may not exceed 36 m and 4.2 kg in males, and 30 cm and 2.4 kg in females. Common sizes in landings range from 15 to 20 cm mantle length.

Interest to Fisheries : Pharaoh cuttlefish supports industrial or artisanal fisheries throughout its range. Separate catch statistics are not included in the FAO Yearbook of Fishery Statistics, but IPFC (1982) reports annual catches for the period from 1969 to 1980 fluctuating between 3 000 and 10 000 metric tons. These catches were taken by the Japanese long distance trawler fleet operating off the People's Democratic Republic of Yemen, following the decrease of Japanese fishing operations off West Africa. It has been suggested to increase the length at first capture through mesh regulations in the fishery off south Yemen in order to improve the catch-effort relationship (Sanders, 1981), but in 1982 the PDRY Government notified the Japanese ventures of the suspension of all operations because of the depletion of the stocks by this time. In the year before, 1981, the catch had already collapsed to 900 metric tons (Hotta, 1982). This species contributes about 90% of the cuttlefish catch off Australia by Chinese (Taiwan Province) pair trawlers amounting to some 1 000 metric tons in 1979 (Liu & Lai, 1980). It also occasionally is taken as bycatch by eastern Queensland prawn trawlers. On the Indian east and west coasts, Pharaoh cuttlefish is frequently caught with hand jigs and trolls, while off Hong Kong, spearing, lure-hooking and trawlers prevail, depending on the season. The flesh is thick, tender and excellent for human consumption.

Local Names : CHINA: Mak mo, Foo baan woo chak; JAPAN: *Torafukouika*, Mongouika (large individuals).

Literature : Tomiyama & Hibiya (1978, Japanese fisheries); Okutani (1980); Sanders (1981, stock assessment, length-weight relationship); Silas *et al.* (1982, biology, India).

Sepia prashadi Winckworth, 1936

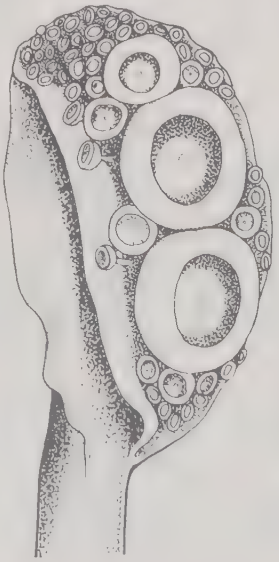
SEP Sep 24

Sepia prashadi Winckworth, 1936, *Proc.Malac.Soc.Lond.*, 22(1):16.

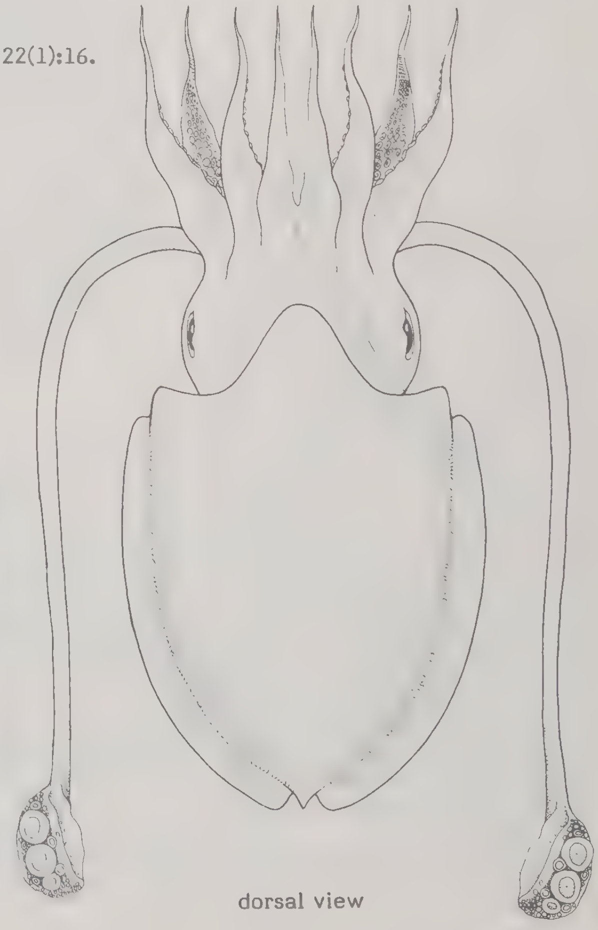
Synonymy : None.

FAO Names : En - Hooded cuttlefish
Fr - Seiche capuchon
Sp - Sepia caperuza

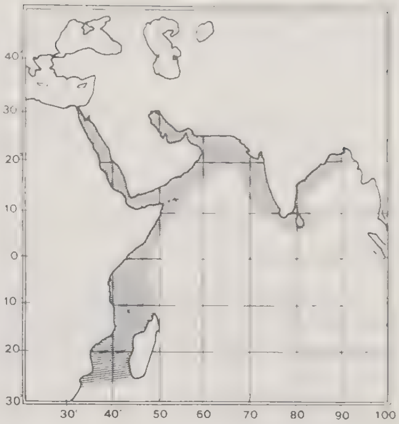
Diagnostic Features : Fins several millimetres shorter than mantle, narrow, separate. Tentacular clubs short, broad; swimming keel broad, strong, slightly longer than the club; sucker-bearing surface nearly separated from the stalk by a very deep cleft under the dorsal protective membrane; both protective membranes well developed, converging but not meeting at proximal base of club and not extending down the stalk; 8 suckers arranged in very oblique series across the club, but the arrangement is greatly distorted by the 2 or 3 enormously enlarged suckers of the 3rd longitudinal row. Left arm IV hectocotylized for most of its length after the 2nd quadriserial row; it is broad, flat, with transverse folds; suckers minute in the 2 very closely packed ventral rows, slightly larger in the dorsal rows which are separated proximally and converge distally.



tentacular club



dorsal view



Geographical Distribution : Western Indian Ocean: from southern Mozambique to the Gulf of Aden, Red Sea, Arabian Sea, Gulf of Oman, Gulf between Iran and the Arabian Peninsula, Indian west and east coasts and Sri Lanka.

Habitat and Biology : A demersal, shallow water species ranging in depth from the coastline to over 40 m.

Size : Maximum mantle length 14 cm; common between 5 and 11 cm in Indian trawl catches off Waltair.

Interest to Fisheries : Taken by trawls in the Red Sea and along the Indian east coast. Off Waltair (northeast India), it is most abundant from the beginning of the year to June and in some years, from October to December; off Madras, it is taken in small quantities in local upwelling areas as bycatch to finfishes normally occurring in deeper waters, i.e., bigeyes (*Priacanthus* spp.) and Indian driftfish (*Ariomma indica*) (Silas *et al.*, 1982). Separate catch statistics are not reported for this species.

Local Names :

Literature : Okutani (1980); Silas *et al.* (1982, biology, India).

Sepia recurvirostra Steenstrup, 1875

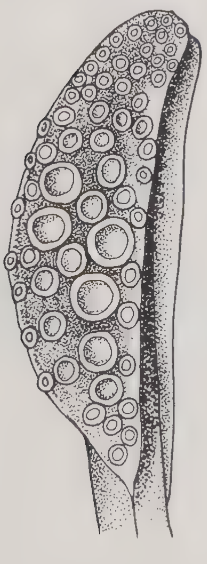
SEP Sep 25

Sepia recurvirostra Steenstrup, 1875, *K.dankse Vidensk Nat.*, (5)10(7):475.

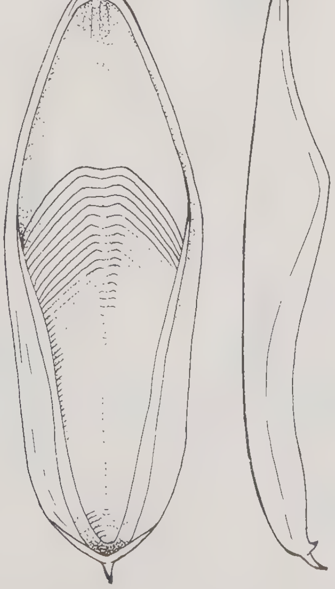
Synonymy : *Sepia singaporensis* Pfeffer, 1884.

FAO Names : En - Curvespine cuttlefish
Fr - Seiche hameçon
Sp - Sepia ganchuda

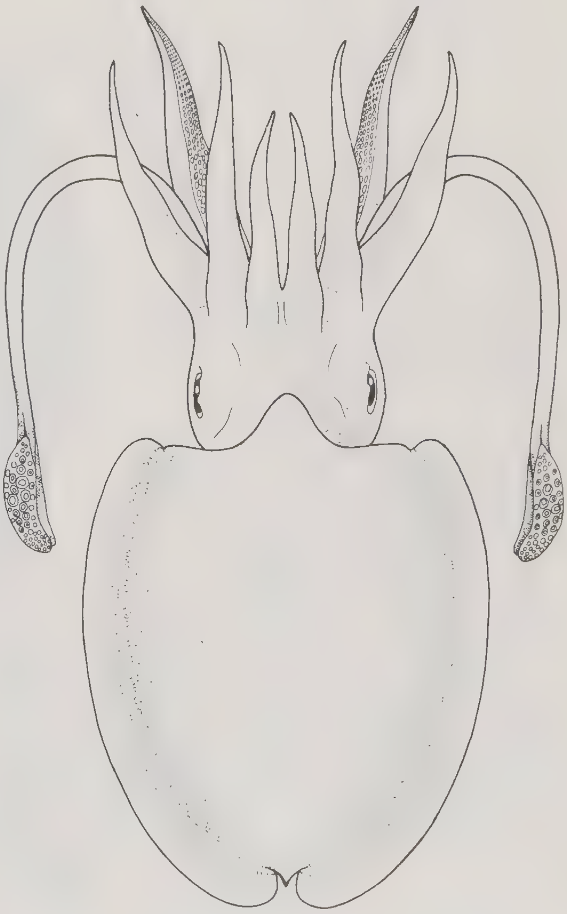
Diagnostic Features : Mantle broad. Tentacles large with relatively small clubs, their swimming keel extending proximally a short distance beyond the base of the club; dorsal protective membrane extending down the stalk for some distance; protective membranes fused at the proximal base; 5 or 6 suckers in transverse rows with 5 or 6 median suckers greatly enlarged; a deep cleft nearly separates the sucker-bearing surface on the fenestrate dorsal protective membrane from the stalk. Left arm IV in males hectocotylized in its proximal third by suckers greatly reduced in size, especially those of the dorsal rows.



tentacular club



frontal view lateral view
cuttlebone



dorsal view

Geographical Distribution : Western Pacific: Andaman Sea, South China Sea, the Philippines and southern East China Sea.

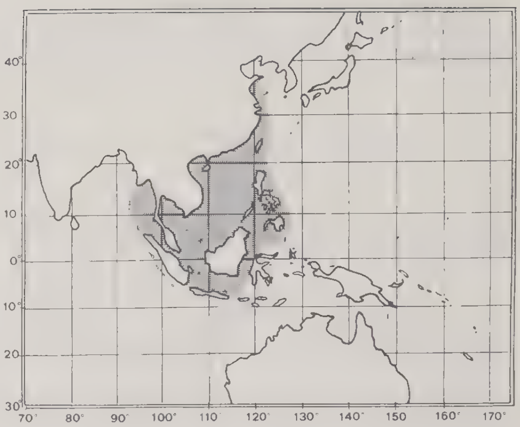
Habitat and Biology : A demersal species inhabiting the continental shelf; in Hong Kong it occurs in depths of 50 to 140 m.

Size : Maximum size 17 cm dorsal mantle length and 0.4 kg weight.

Interest to Fisheries : This species is of some commercial relevance in Hong Kong where it enters multispecies trawl catches. Separate statistics are not reported for this species.

Local Names : CHINA: Jam mak yue; JAPAN: Asia kouika.

Literature : Tomiyama & Hibiya (1978); Okutani (1980).



Sepia savignyi Blainville, 1827

SEP Sep 26

Sepia savignyi Blainville, 1827, Dict.Sci.Nat., 48:285.

Synonymy : None.

FAO Names : En - Broadback cuttlefish
Fr - Seiche gros dos
Sp - Sepia robusta

Diagnostic Features : Mantle broadly oval, acuminate posteriorly. Tentacles long, slender, clubs narrow, their swimming keels narrow, barely extending beyond base of club; protective membranes narrow, separate, extending along stalk; 8 moderate-sized, subequal suckers (median ones slightly enlarged) in oblique, transverse rows.

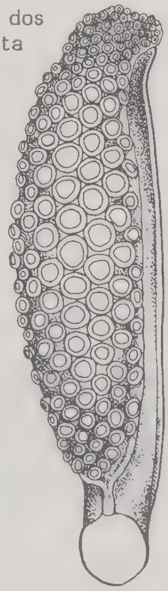
Geographical Distribution : Western Indian Ocean: Red Sea, Gulf between Iran and the Arabian Peninsula and Gulf of Oman.

Habitat and Biology : A demersal neritic species; known depth range from about 25 to 70 m.

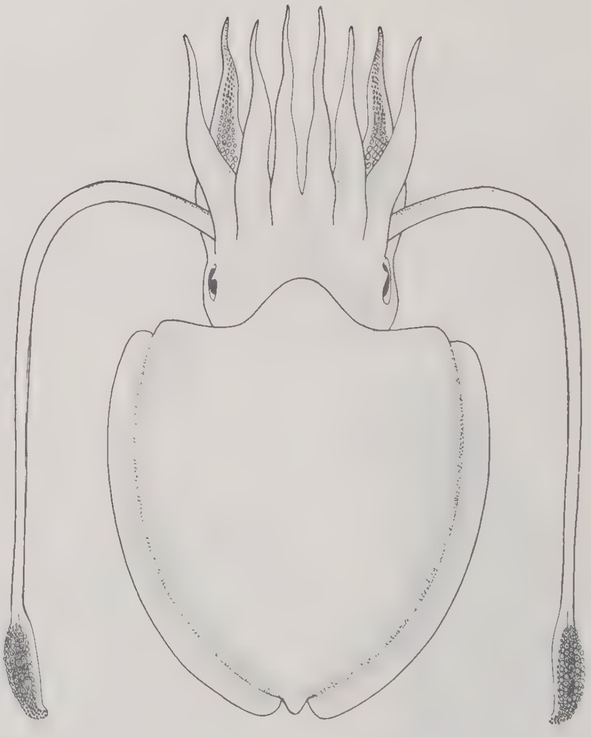
Size : Maximum mantle length 13 cm.

Interest to Fisheries : Undetermined.

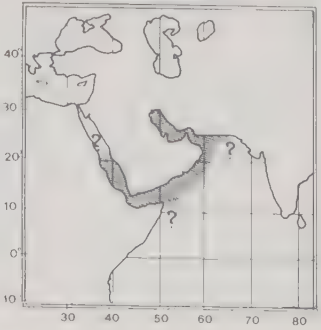
Local Names :



tentacular club



dorsal view



Sepia trygonina (Rochebrune, 1884)

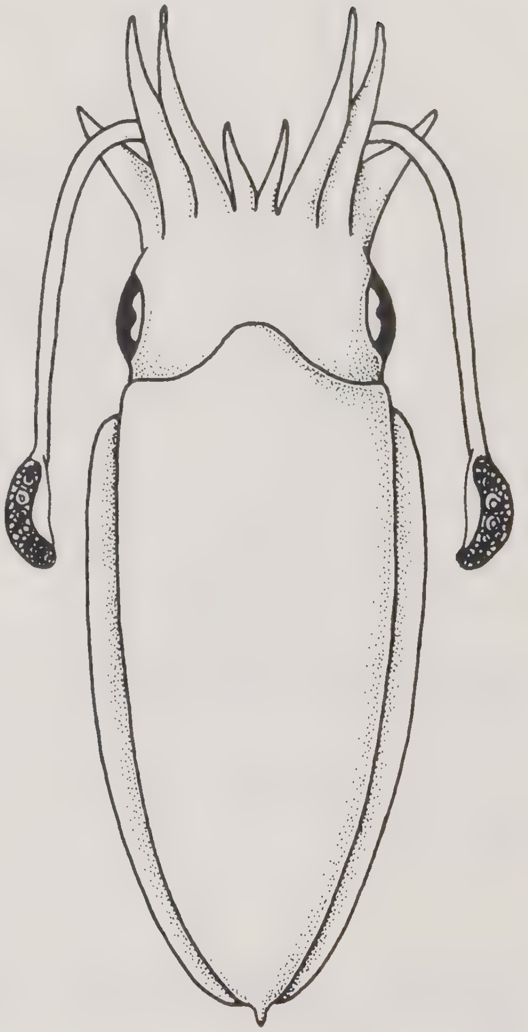
SEP Sep 27

Dorasepion trygoninum Rochebrune, 1884, Bull.Soc.Philomath.Paris, (7)8:74-122.

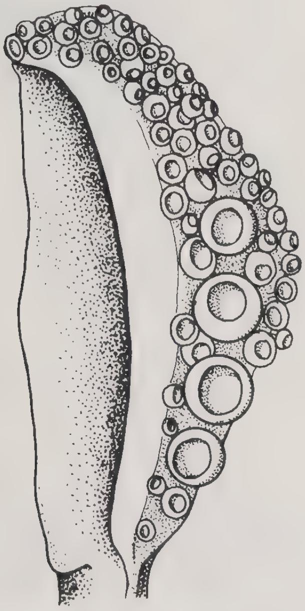
Synonymy : Dorasepion trygoninum Rochebrune, 1884.

FAO Names : En - Trident cuttlefish
Fr - Seiche trident
Sp - Sepia tridente

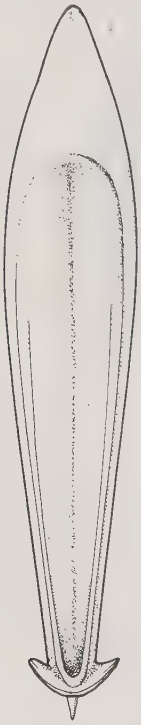
Diagnostic Features : Mantle elongate, narrow, bluntly tapered posteriorly. Fins narrow. Tentacular clubs short, with a well developed swimming keel extending proximally beyond the base of the club; dorsal protective membrane broad and separated at base from the ventral membrane; 8 suckers in very oblique, transverse rows; about 5 suckers in third longitudinal series greatly enlarged. Left arm IV hectocotylized; proximal third normal, followed by an area devoid of suckers, with a hollowed-out surface, covered with large, wrinkled protective membranes; distal part normal.



dorsal view

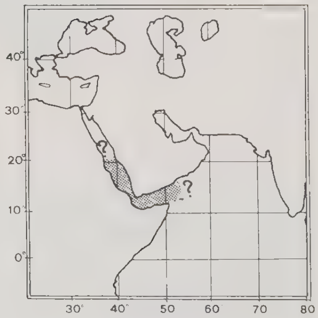


tentacular club



cuttlebone

Geographical Distribution : Western Indian Ocean: Gulf of Aden and Red Sea (northern limits undetermined).



Habitat and Biology : A demersal species occurring over a depth range from 35 to 415 m.

Size : Maximum mantle length 5 cm.

Interest to Fisheries : Reported from a bottom-trawl resources survey in the Gulf of Aden, but its fishery potential is presently undetermined.

Local Names :

Sepia (Metasepia) tullbergi Appellöf, 1886

SEP Sep 28

Metasepia tullbergi Appellöf, 1886, K.Sven Vetensk Adad.Handl., 21(13):26.

Synonymy : None.

FAO Names : En - Paintpot cuttlefish
Fr - Seiche encrier
Sp - Sepia tintero

Diagnostic Features : Mantle as broad as long; dorsal surface of mantle, head and arms rugose; ventral surface of mantle with 10 to 13 pores on each side anteriorly. Fins broad and fused posteriorly. Tentacular clubs short, crescent-shaped with a broad swimming keel extending proximally on stalk for half the club length; dorsal protective membrane broad, separated at base of club from ventral protective membrane; 4 or 5 minute suckers in transverse rows across the club, 3 or 4 suckers enlarged. Arm suckers biserial; left arm IV hectocotylized, the basal two thirds has 10 to 12 pairs of minute, widely spaced suckers, the rows separated by a transversely ridged area, distal third with 5 or 6 pairs of enlarged suckers followed by minute suckers at the tip. Shell broad, acuminate anteriorly, nearly completely chitinized anteriorly, calcareous posteriorly.

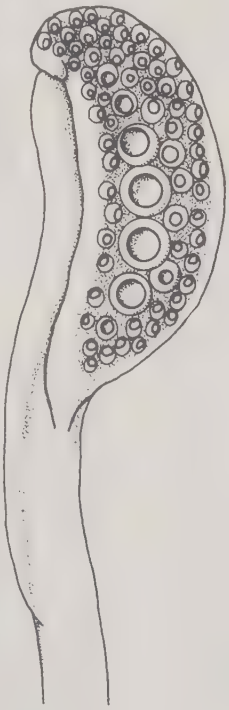
Geographical Distribution : Western Pacific: Sea of Japan, Yellow Sea to Hong Kong and Taiwan (Province of China).

Habitat and Biology : A neritic, demersal species occurring on the continental shelf between the 40 and 100 m depth contours.

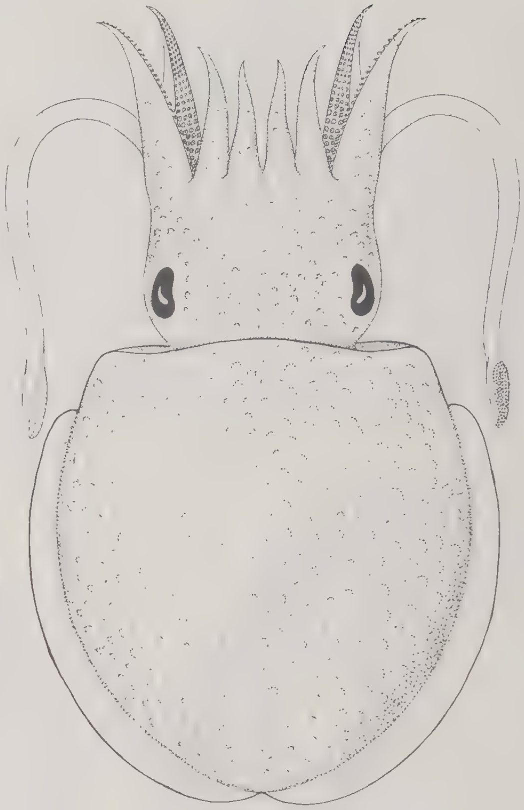
Size : Maximum mantle length 7 cm.

Interest to Fisheries : Currently there is no industrial fishery for this species. Its relevance in artisanal fisheries is undetermined.

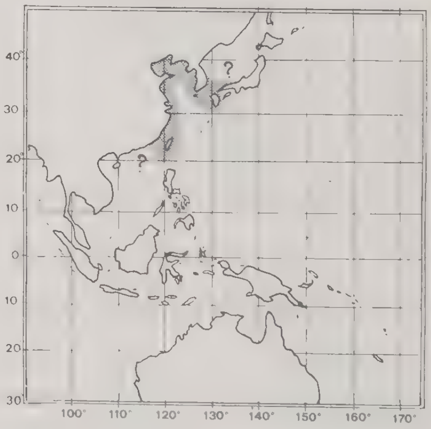
Local Names : CHINA: Mak dau.



tentacular club



dorsal view



Sepiella inermis Orbigny, 1848

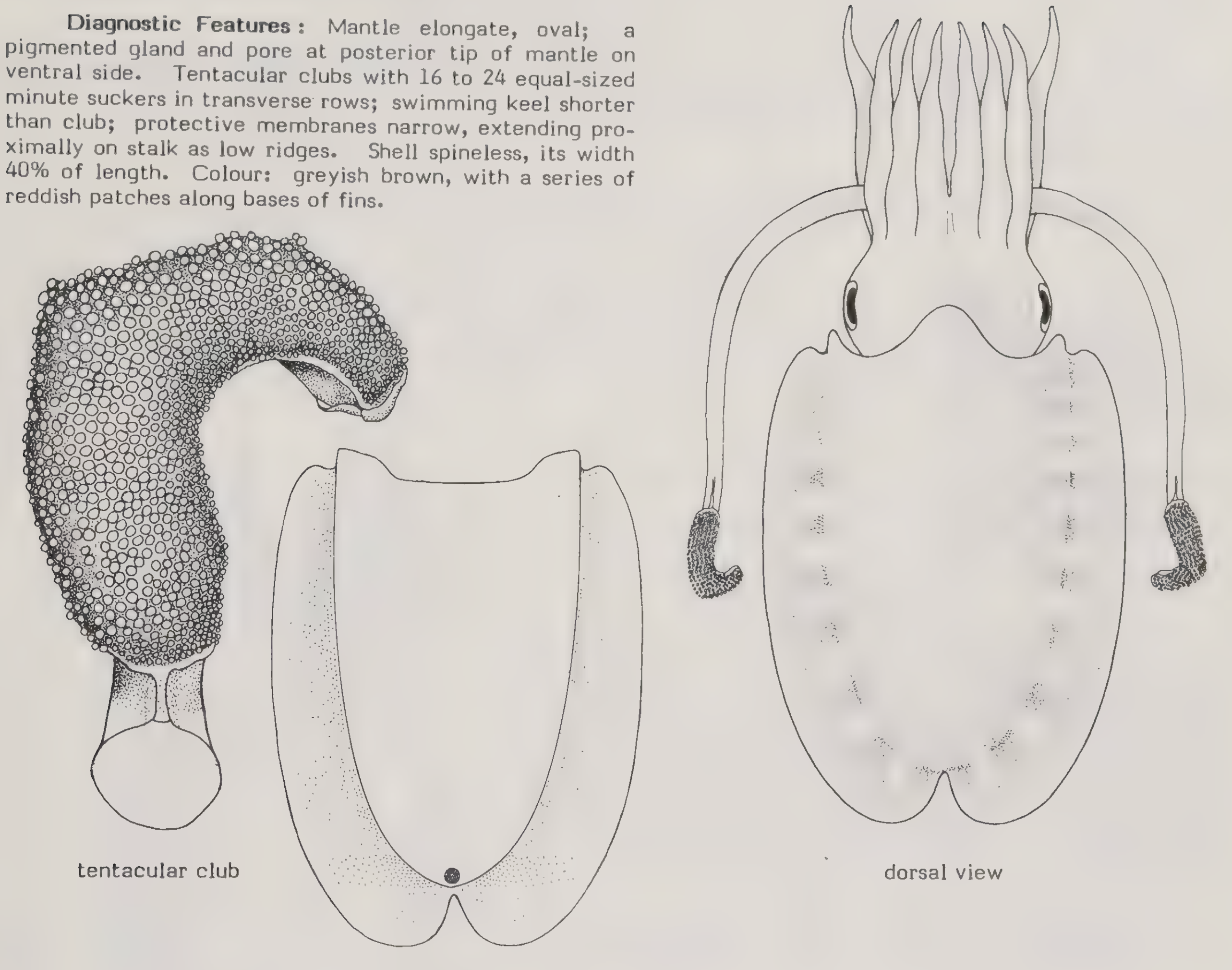
SEP Sepie 2

Sepiella inermis Orbigny, 1848 (in 1834-1848), Hist.nat.Ceph.acetab.:286.

Synonymy : Sepia (Sepiella) microcheirus Gray, 1849; Sepia affinis Eydoux & Souleyet, 1852; Sepiella maindroni Rochebrune, 1884.

FAO Names : En - Spineless cuttlefish
Fr - Sépia inerme
Sp - Sepia inerme

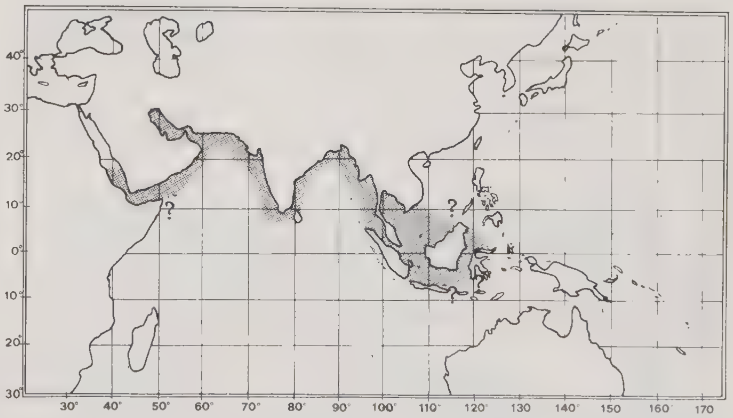
Diagnostic Features : Mantle elongate, oval; a pigmented gland and pore at posterior tip of mantle on ventral side. Tentacular clubs with 16 to 24 equal-sized minute suckers in transverse rows; swimming keel shorter than club; protective membranes narrow, extending proximally on stalk as low ridges. Shell spineless, its width 40% of length. Colour: greyish brown, with a series of reddish patches along bases of fins.


tentacular club

ventral view

dorsal view

Geographical Distribution : Indo-Pacific: Indian Ocean, southern Red Sea, Gulf of Aden to Andaman Sea and southern South China Sea.



Habitat and Biology : A demersal shallow-water species occurring to depths of about 40 m.

Spawning extends almost throughout the year with seasonal peaks in correlation with environmental conditions; off Kakinada and Waltair (northeast India) from June to September and from November to December; off Madras, in September, December and March; off Portonovo from March to October; off Cochin (southwest coast) in April and from September through October. The majority of spawning cuttlefish are aged 9 to 12 months on the east coast and about 18 months on the west coast. Capsules containing several eggs are attached to various substrates in very shallow waters. Growth varies according to environmental conditions. Hatchlings may attain 2.9 to 3.5 cm mantle length after 6 months. At the end of one year, they can grow to sizes ranging from 5.3 cm (Kakinada), to 6.1 cm (Cochin), while after 18 months they reach 7.4 cm (Waltair and Kakinada) to 8.2 cm (Madras). Longevity on the east coast is estimated at 1½ to 2 years, while on the west coast it is believed to be over 2 years (Silas et al., 1982).

Food of spineless cuttlefish consists primarily of small demersal fishes and crustaceans; cephalopods are a minor component of its diet.

Size : Maximum mantle length about 12.5 cm; maximum lengths in the Indian trawl catches are 11.2 cm on the east coast and 12.4 cm on the west coast off Cochin. Length at first maturity varies with stocks: off Waltair it is about 5.3 cm for males and 5.2 cm for females; off Madras, about 5.6 cm and 6.0 cm; and off Cochin 8.1 cm and 8.3 cm, respectively. Females grow larger than males (Silas et at., 1982).

Interest to Fisheries : One of the main commercial species in India and Sri Lanka, but separate statistics are not reported. Caught by trawls and a variety of artisanal gears, such as beach seines, fixed bag nets ("dol nets"), etc. In the Andaman Sea it is caught by push nets.

Local Names :

Literature : Okutani (1980); Silas et al. (1982, biological information on Indian stocks).

Sepiella japonica Sasaki, 1929

SEP Sepie 3

Sepiella japonica Sasaki, 1929, J.Coll.Agri., Hokk, 20:219.

Synonymy : Sepiella heylei Sasaki, 1929.

FAO Names :
En - Japanese spineless cuttlefish
Fr - Sépia inerme japonaise
Sp - Sepia inerme japonesa

Diagnostic Features : Mantle broadly oval; pore of caudal gland at posterior tip ventral to fins. Tentacular clubs elongate, with 20 minute subequal suckers in transverse rows. Arm suckers quadriserial; left arm IV hectocotylized in proximal third with the basal part modified by great reduction in size of suckers placed on a transversely ridged surface; ventral 2 rows of suckers close together, dorsal 2 rows separated. Shell spineless, its width 30 to 35% of length. Colour: upper surface of mantle dark brown, covered with white spots.

Geographical Distribution : Western Pacific: East China Sea, Taiwan (Province of China) to southern Japan.

Habitat and Biology : A coastal demersal species ranging in depth from the surface to about 50 m. The spawning season varies with temperature and usually peaks during February and March off Hong Kong and in May off Japan.

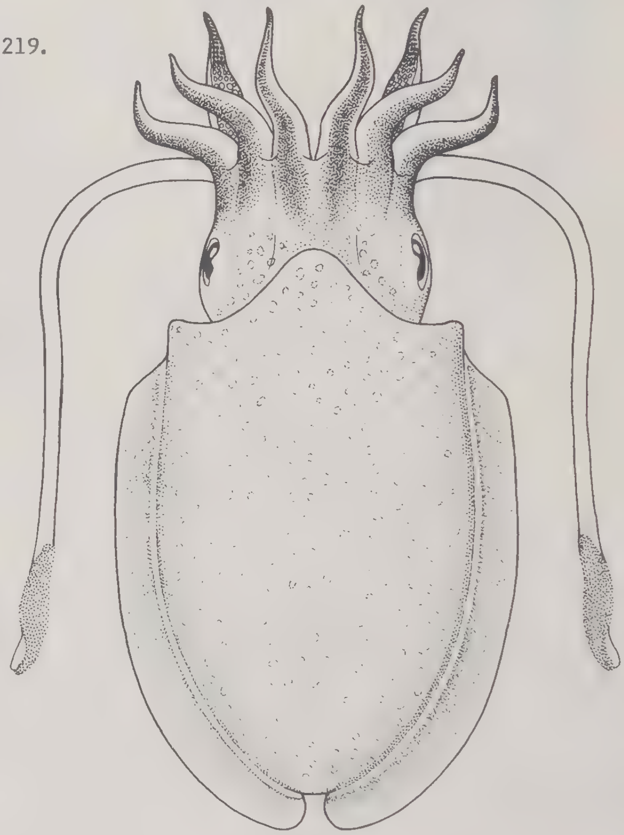
Size : Maximum size 20 cm mantle length and 0.8 kg weight.

Interest to Fisheries : The dominant cuttlefish caught in the Chekiang and Kiangsu provinces of China. It supports local trawl fisheries in southwestern Japan and is, in some years, very abundant in Hong Kong waters. In Japan most of the catch is dried and marketed as "surume".

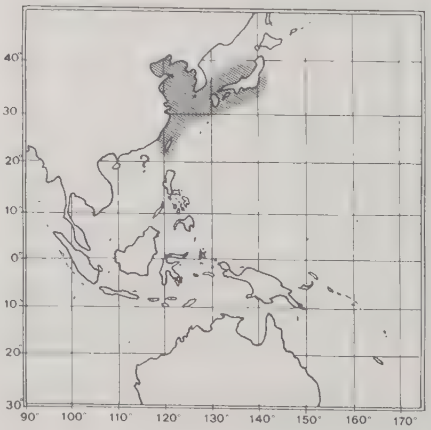
Local Names : CHINA: Mo jam woo chak, Ngor huet mak, JAPAN: Harinashikouika, Shirikusari, Shiriyakeika, Tsubekusari.

Literature : Voss & Williamson (1971, Hong Kong); Tomiyama & Hibiya (1978, Japanese fisheries); Okutani (1980).

Remarks : The species has been reared successfully in aquaculture experiments (Choe, 1966; under the name Sepiella maindroni).



dorsal view



Sepiella ornata (Rang, 1837)

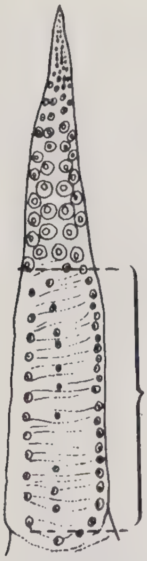
SEP Sepie 1

Sepia ornata Rang, 1837, Mag.Zool., 7(CL.V):76.

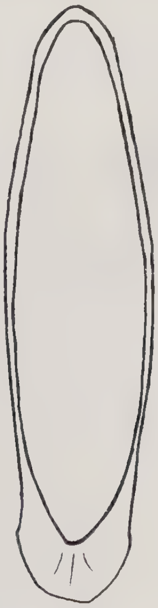
Synonymy : Sepia ornata Rang, 1837.

FAO Names :
En - Ornate cuttlefish
Fr - Sépia ornée
Sp - Sepia orlada

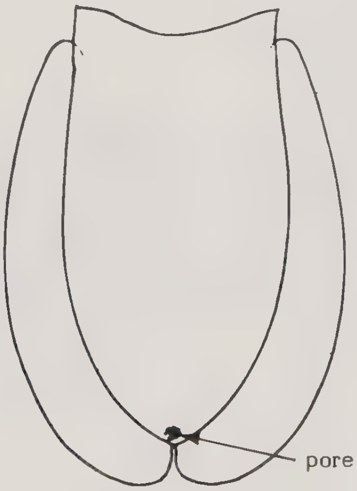
Diagnostic Features : Mantle elongate, ovoid; a round gland and pore visible ventrally between fins at posterior end. Tentacular clubs narrow, with 10 to 14 minute, equally sized suckers in transverse rows. Left arm IV hectocotylized on proximal half with 4 rows of minute suckers, the 2 dorsal rows widely separated, the 2 ventral rows close-set in a zig-zag pattern. Cuttlebone with broad, wing-like outer cone, spine absent, width 24 to 30% of length. Colour: reddish patches along dorsal bases of fins.



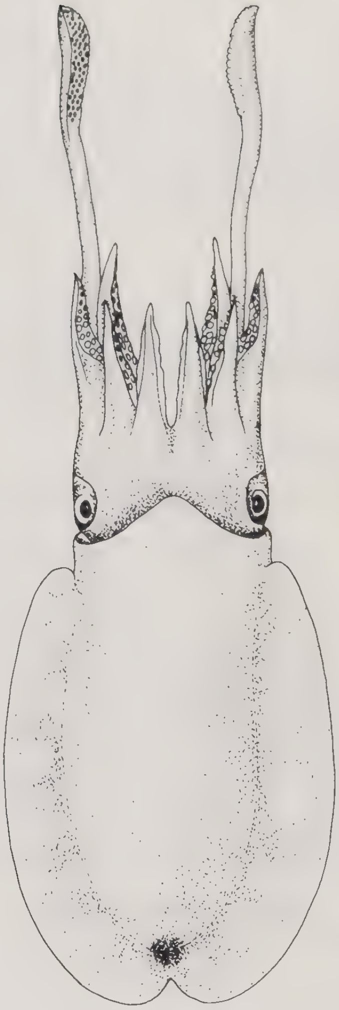
left arm IV of male hectocotylized



cuttlebone

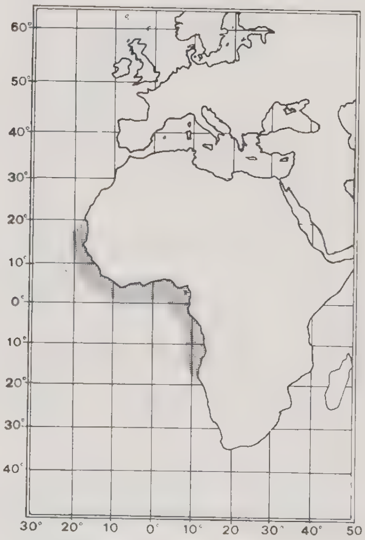


ventral view of mantle and fins



dorsal view

Geographical Distribution : Eastern Atlantic: from Angola to Mauritania.



Habitat and Biology : A demersal species ranging from about 20 to 150 m depth but most abundant in waters deeper than 50 m.

Size : Maximum mantle length 10 cm.

Interest to Fisheries : It is taken mostly as bycatch in bottom trawls mixed with Sepia species, the highest yields coming from waters deeper than 50 m.

Local Names :

Literature : Tomiyama & Hibiya (1978, Japanese fisheries); Okutani (1980); Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part).

3.2 FAMILY SEPIADARIIDAE Naef, 1912

SEPI

FAO Names :
En - Bottletail squids
Fr - Sépiolettes
Sp - Sepiolillas

Diagnostic Features : Mantle margin fused to head dorsally; ventral margin of mantle permanently fused with base of funnel on both sides, therefore no locking apparatus; tentacle stalk held in a deep sheath or web between bases of arms III and IV; restricted to the Indo-Malayan region. Left ventral arm (IV) of male hectocotylized; arm suckers in 2 rows proximally, 4 rows on distal third. Gladius absent.

Sepiadarium kochii Steenstrup, 1881

SEPI Sepiad 1

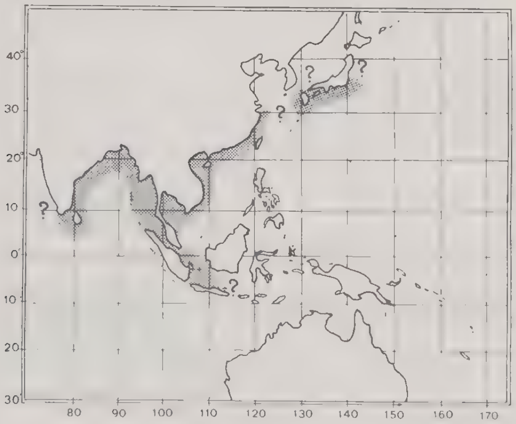
Sepiadarium kochii Steenstrup, 1881, *K.danska Vidensk.Selsk. Skrifter*, 1881:218.

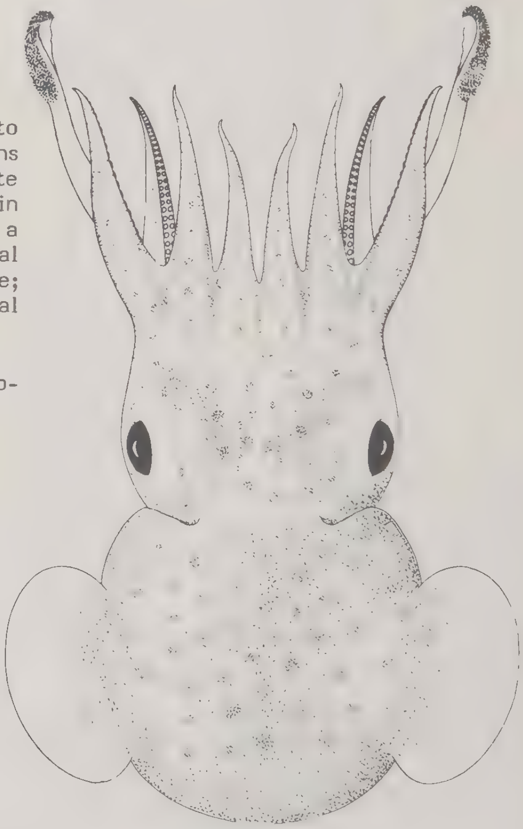
Synonymy : *Sepiadarium malayense* Robson, 1932.

FAO Names :
En - Bottletail squid
Fr - Sépiolette
Sp - Sepiolilla

Diagnostic Features : Mantle nearly round in outline, fused to head dorsally and to base of funnel on both sides ventrally. Fins lobate, widely separated. Tentacular clubs broad with 8 minute suckers in transverse rows; tentacular stalk slender, sheathed in pocket between arms III and IV. Left arm IV hectocotylized by a single series of folds or laminae across the oral surface of its distal half; its ventral side bordered with a broad, crenulate membrane; some suckers on arms of males enlarged. Colour: entire dorsal surface with irregular orange spots.

Geographical Distribution : From Japan through the Indo-Malayan region to India.





dorsal view

Habitat and Biology : Found in coastal waters to 60 m depth.

Size : Maximum mantle length 2 cm.

Interest to Fisheries : Undetermined.

Local Names :

Literature : Voss & Williamson (1971, Hong Kong).

3.3 FAMILY SEPIOLIDAE Leach, 1817

SEPIOL

Sepiolidae Leach, 1817, Zool.Misc., 3(30):137.

FAO Names : En - Bobtail squids, Mickey mouse squids
Fr - Sépioles
Sp - Globitos, Rondeletiolas, Sepietas, Sepiolas

Diagnostic Features : Mantle short, broad, sac-like, with large, rounded fins inserted at mid-length. Eyes covered with "corneal" membranes. One or both dorsal arms, or one dorsolateral arm, hectocotylized; no protective membranes on arms. Gladius (inner shell) greatly reduced, non-calcified. Colour: generally pinkish to maroon, darkest dorsally.

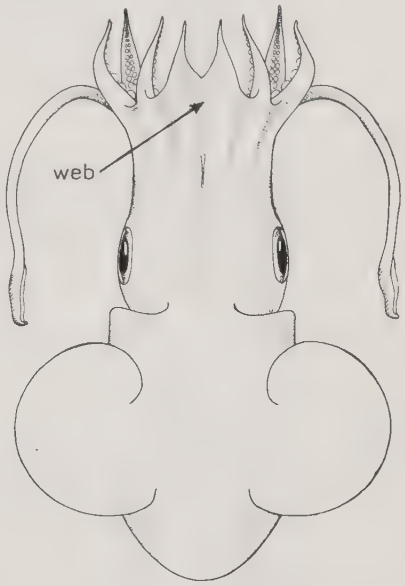
General Remarks on the Family : Small-sized (up to 10 cm mantle length), compact squid-like cephalopods of such heterogeneity that 3 subfamilies and 13 genera are known. This is the most divergent and speciose family of sepioids with representatives in all oceans and seas ranging from intertidal to deep-sea benthic and even mesopelagic hatitats; very little is known about their biology. Most species are unsuitable for a directed large-scale fishery because of their small size, scattered distribution, or relatively poor quality of flesh.

Key to Subfamilies and Genera :

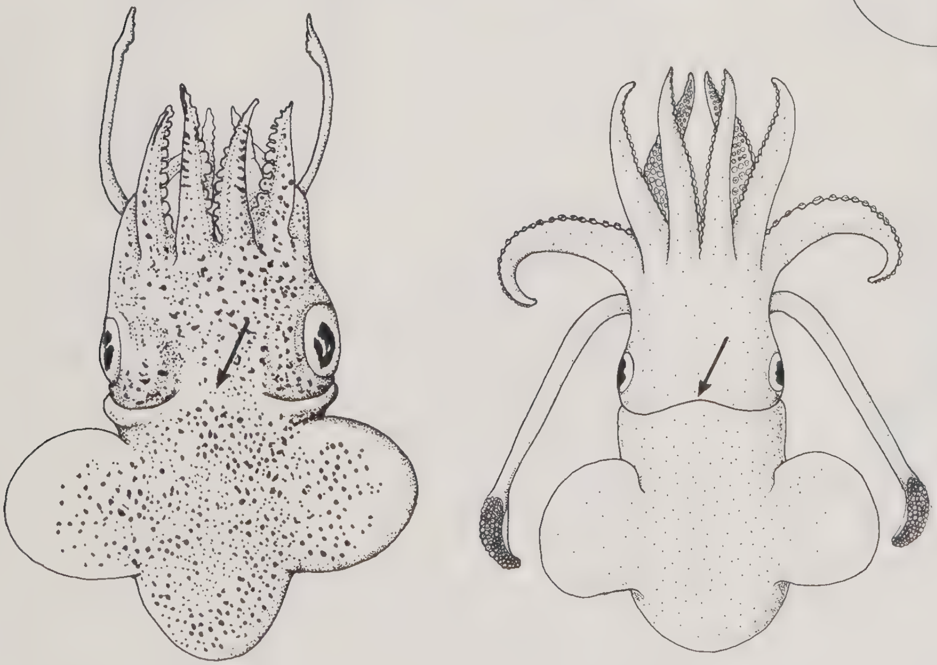
1a. All arms except the fourth pair (IV) united by a broad web (Fig. 1); orbital pores closed; pelagic .... **Subfamily Heteroteuthinae Sepiolina***

1b. Only third (III) and fourth (IV) arms united by a broad web (Fig. 2); orbital pores open; benthic

2a. Dorsal border of mantle fused with head (Fig. 2a) .... **Subfamily Sepiolinae**



Heteroteuthinae
(Sepiolina)
dorsal view
Fig. 1



a.
Sepiolinae
(Sepiolina)

dorsal view

b.
Rossinae
(Rossia)

Fig. 2

---

* Plus four other genera lacking interest to fisheries and therefore not included here

3a. Light organs present on ink sac

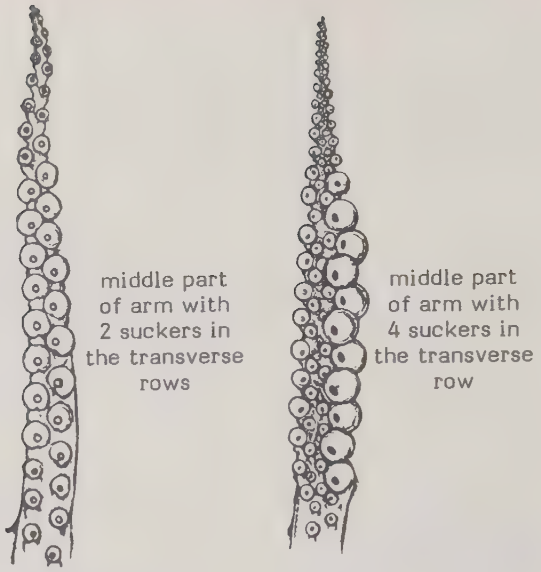
4a. Gladius rudimentary; up to 16 tentacular club suckers in transverse series across the club; usually 2 suckers in transverse rows on arms (Fig. 3a); light organs not saddle-shaped

5a. Suckers at tip of arm IV occasionally 4 in a row; 8 tentacular club suckers in transverse rows; light organs ear-shaped (Fig. 4) .... **Sepiola**

5b. Suckers at tip of arm IV always 2 in a row; 16 tentacular club suckers in transverse rows; light organs not ear-shaped (Fig. 5) .... **Rondeletiola**

4b. Gladius absent; tentacular club with more than 16 suckers in a row, but in 2 rows at bases and tips (Figs 6, 3b); light organ saddle-shaped .... **Euprymna**

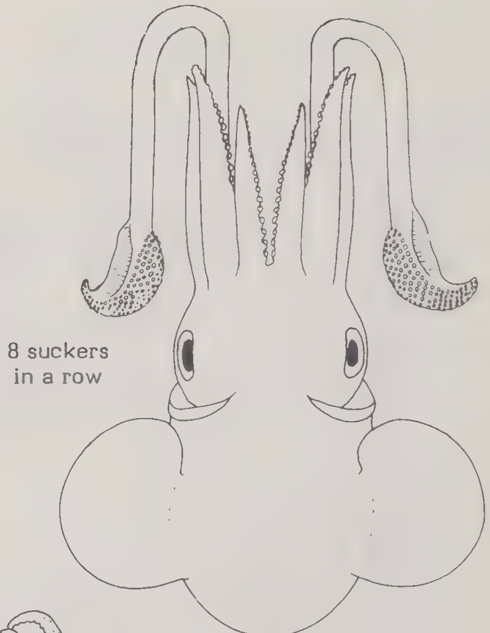
3b. Light organs absent from ink sac


middle part
of arm with
2 suckers in
the transverse
rows
middle part
of arm with
4 suckers in
the transverse
row

a. Sepiola
Rondeletiola

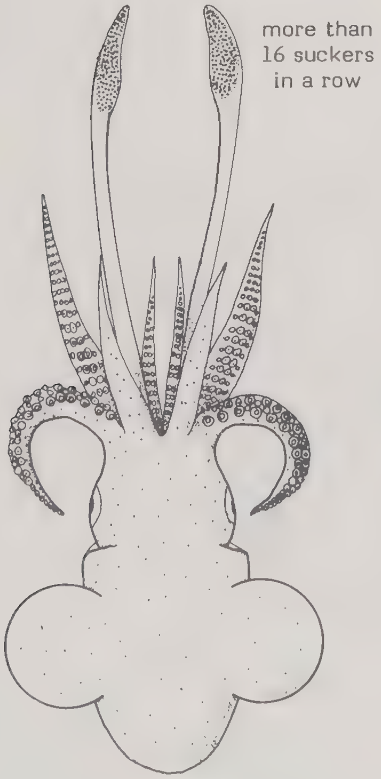
b. Euprymna

Fig. 3


8 suckers
in a row

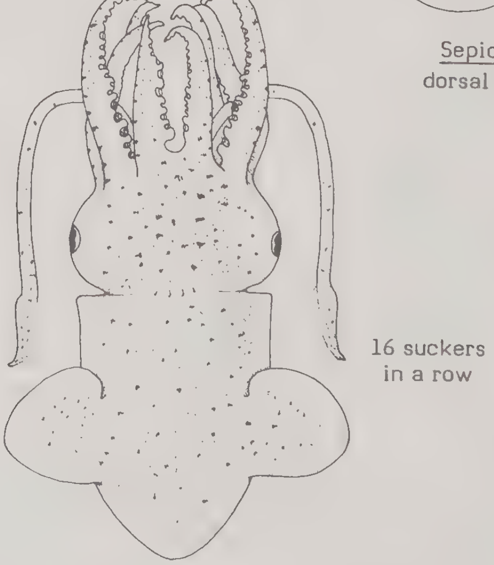
Sepiola
dorsal view

Fig. 4


more than
16 suckers
in a row

Euprymna
dorsal view

Fig. 6


16 suckers
in a row

Rondeletiola
dorsal view

Fig. 5

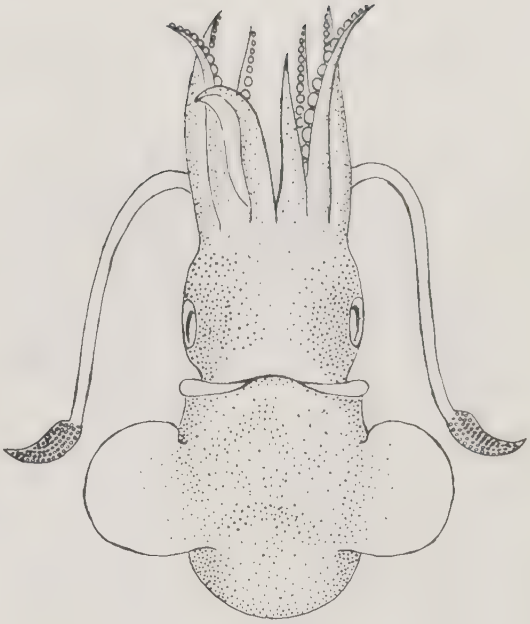
6a. Left dorsal arm (I) hectocotylized by a broad, suckerless, concave zone between sucker rows; arms III in males slightly S-shaped (Fig. 7a,b) .... **Sepietta**

6b. Left dorsal arm (I) hectocotylized with a large, fleshy protrusion at base; arms III in males strongly S-shaped, curved towards mouth (Fig. 8) .... **Inioteuthis**

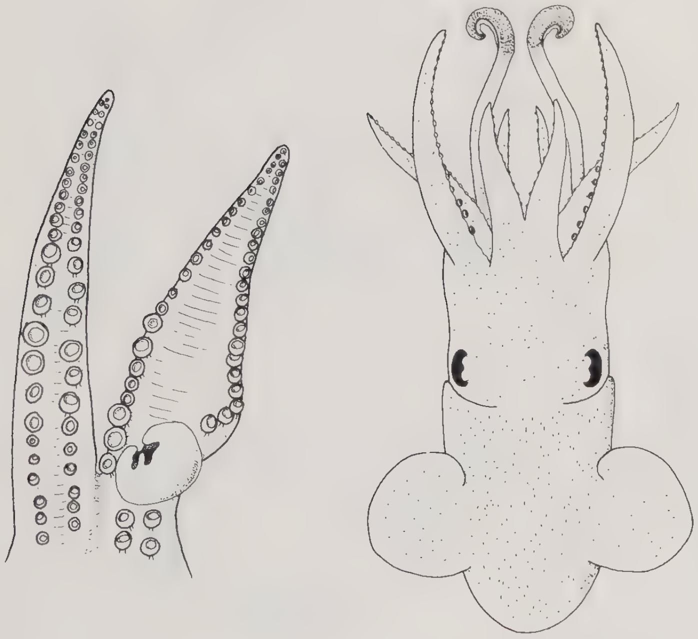
2b. Dorsal border of mantle not fused with head Fig. 2b) .... **Subfamily Rossinae**

7a. Light organs present on ink sac; right dorsal arm (I) of male hectocotylized (Fig. 9) .... **Semirossia**

7b. Light organs absent from ink sac; both dorsal arms (I) of males hectocotylized (Figs 10, 11)



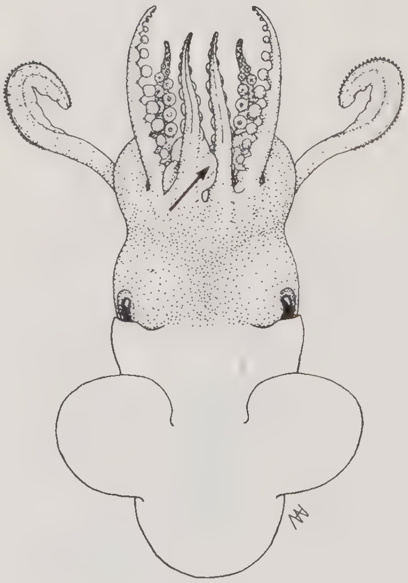
Semirossia
dorsal view
Fig. 9



a.
left arm I
hectocotylized

b.
Sepietta
dorsal view

Fig. 7

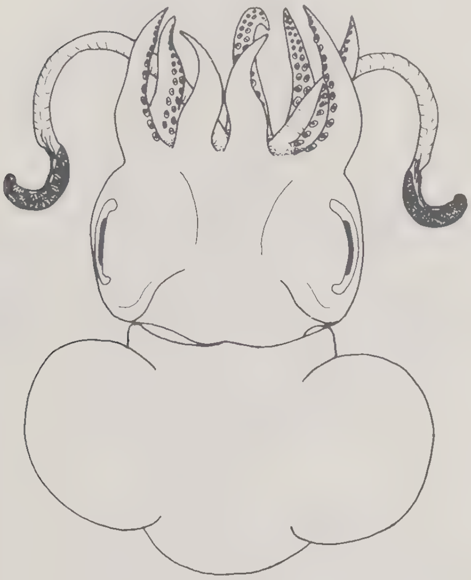


Inioteuthis
dorsal view

Fig. 8

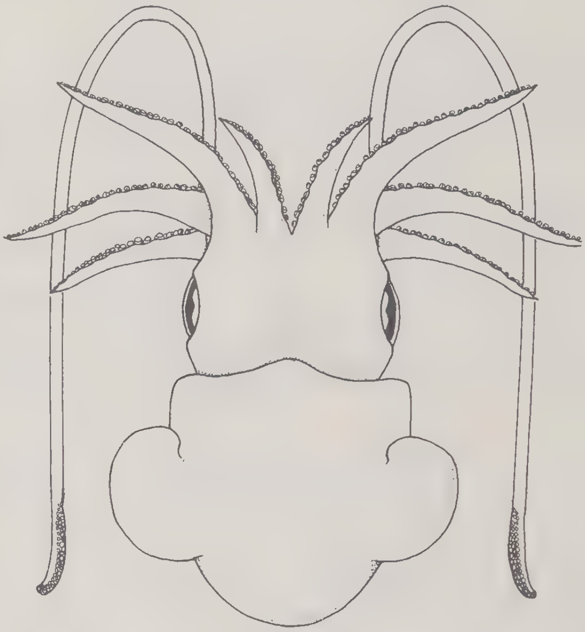
8a. Ink sac functional; anal flaps well-developed (Figs 10, 12a) .... **Rossia**

8b. Small ink sac non-functional, anal flaps very poorly developed, degenerate (Figs 12b, 11) .... **Neorossia**



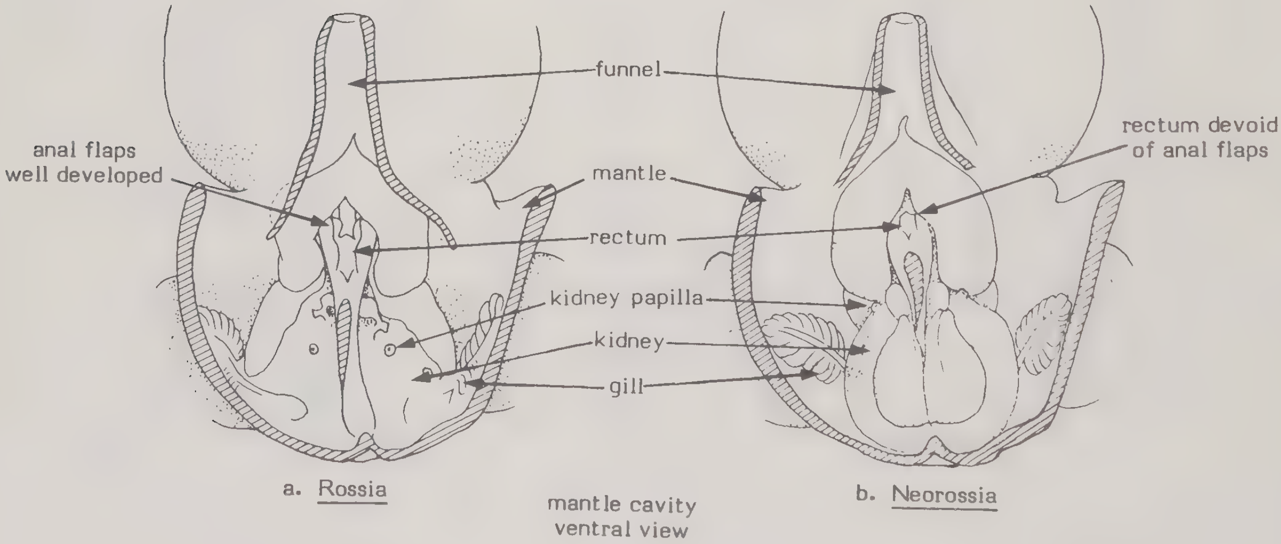
Rossia

dorsal view Fig. 10



Neorossia

dorsal view Fig. 11


funnel
anal flaps well developed
mantle
rectum devoid of anal flaps
rectum
kidney papilla
kidney
gill

a. Rossia b. Neorossia

mantle cavity ventral view

Fig. 12

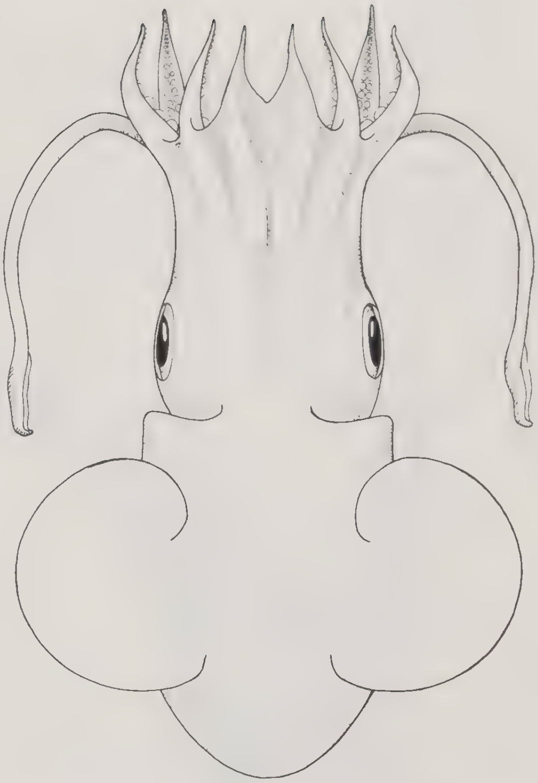
Sepiolina nipponensis (Berry, 1911)

SEPIOL Sepioli 1

Stoloteuthis nipponensis Berry, 1911, Zool.Anz., 37(2):39.

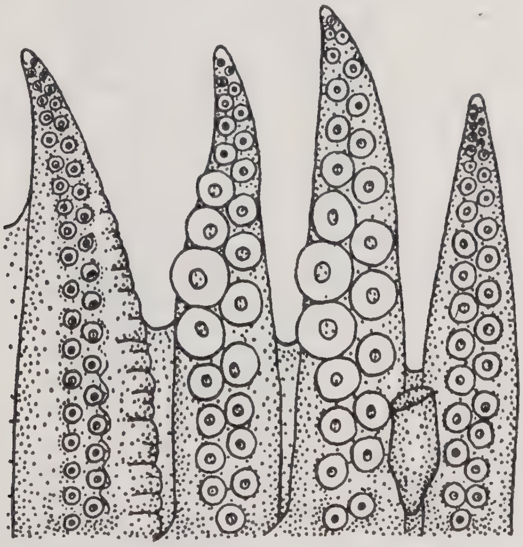
Synonymy : Stoloteuthis nipponensis Berry, 1911.

FAO Names :
En - Japanese bobtail
Fr - Sépiole gros yeux
Sp - Sepiolina



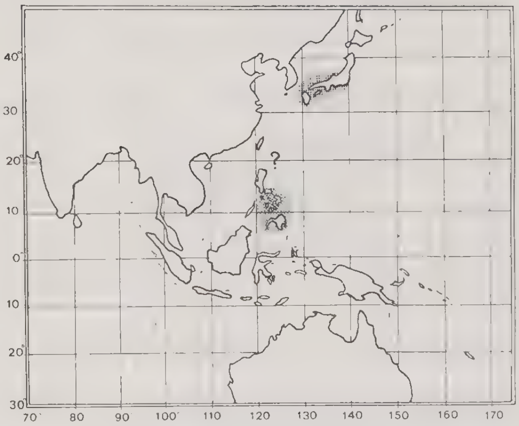
dorsal view

Diagnostic Features : Mantle purse-shaped, fused to head, 3/4 as wide as long. Fins large, deeply lobed anteriorly. Head broad. Tentacular clubs with 16 minute, subequal, subglobular suckers in transverse rows; swimming keel narrow, extending for a short distance along stalk. Arms short; all of them, except arms IV fused by a broad web; arm suckers biserial; in females numerous, small thoughout, in males fewer and enlarged on arms II to IV, especially II and III; both dorsal arms (I) hectocotylized by minute, widely separated suckers on very short stalks.



arms of left side of male
(oral view)

Geographical Distribution : Western Pacific Ocean: recorded from southern Japan and the Philippines.



Habitat and Biology : A neritic species occurring on the continental shelf down to 200 m depth.

Size : Maximum mantle length 4 cm.

Interest to Fisheries : Undetermined.

Local Names :

Literature : Okutani (1980).

Sepiola atlantica Orbigny, 1840

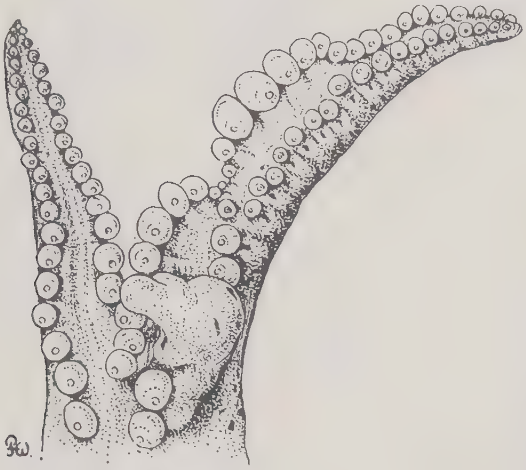
SEPIOL Sepiol 2

Sepiola atlantica Orbigny, 1840 (in 1834-1848), Hist.Nat.Ceph.Acet.Viv.Foss., 235.

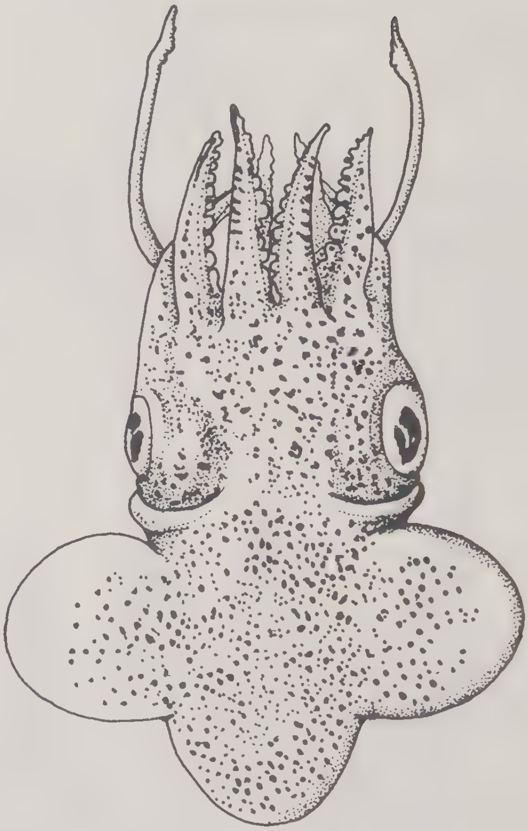
Synonymy : None.

FAO Names :
En - Atlantic bobtail
Fr - Sépiole grandes oreilles
Sp - Sepiola atlántica

Diagnostic Features : Tentacular clubs with 8 suckers in transverse rows . Left arm I hectocotylized by a large swollen bulb, with secondary lobes basally; suckers of dorsal row swollen basally, followed by 3 or 4 greatly reduced suckers, then by 4 or 5 greatly swollen suckers in midportion.

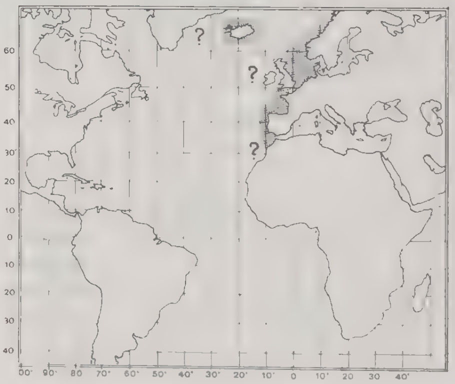


left arm I of male hectocotylized



dorsal view

Geographical Distribution : Northeast Atlantic Ocean: from Iceland and Norway to northwest Africa.



Habitat and Biology : No information available.

Size : Maximum mantle length 1.5 cm.

Interest to Fisheries : Undetermined.

Local Names :

Sepiola birostrata Sasaki, 1918

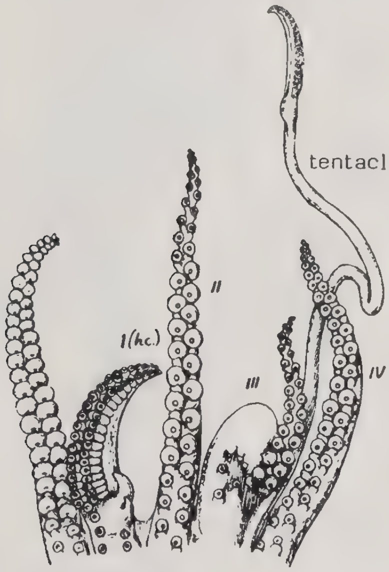
SEPIOL Sepiol 3

Sepiola birostrata Sasaki, 1918, Zool.Mag.Tokyo, 30:235-6.

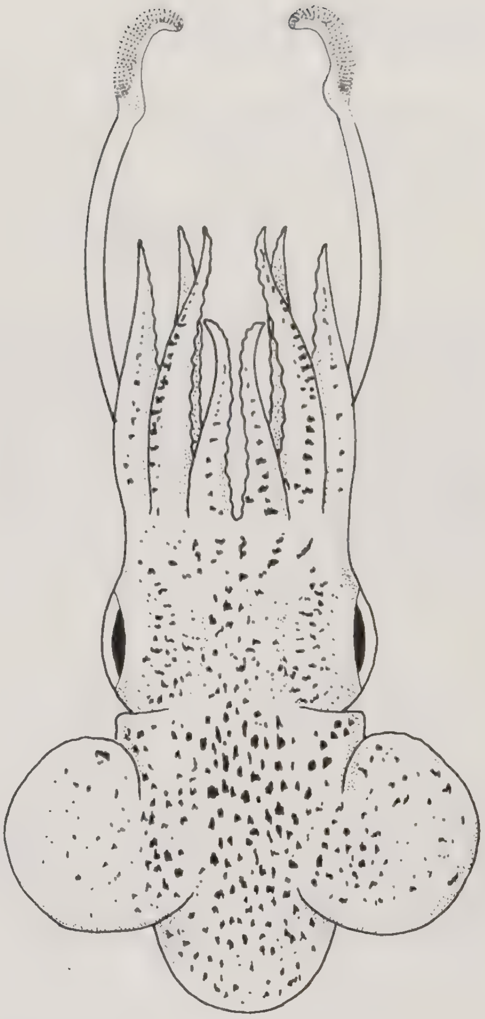
Synonymy : None.

FAO Names : En - Butterfly bobtail
Fr - Sépiole papillon
Sp - Sepiola mariposa

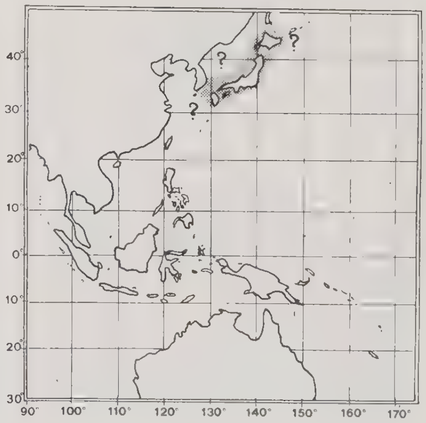
Diagnostic Features : Mantle relatively elongate. Tentacles slender, 2 times longer than arms, their clubs about 1/4 of tentacle length, slightly expanded; swimming keel very narrow distally, with a broad, thick, semilunar flap proximally, opposite the carpus; club suckers minute, subequal, largest and numbering 4 in a series across the club proximally, diminishing in size and increasing to 16 in each transverse row more distally. Left arm I hectocotylized, 1/2 to 4/5 of the length of right arm I, much thickened; 4 or 5 minute suckers basally, followed by a large swelling of 2 recurved, pointed rostrae; remaining suckers much reduced, attached to closely packed, prism-like stalks.



arms of male


dorsal view

Geographical Distribution : Western Pacific Ocean: Japan and Cape Clonard, Republic of Korea.



Habitat and Biology : Depth range undetermined.

Size : Maximum mantle length undetermined.

Interest to Fisheries : Reported to be locally consumed in China, but its actual and potential interest to fisheries has not been assessed.

Local Names :

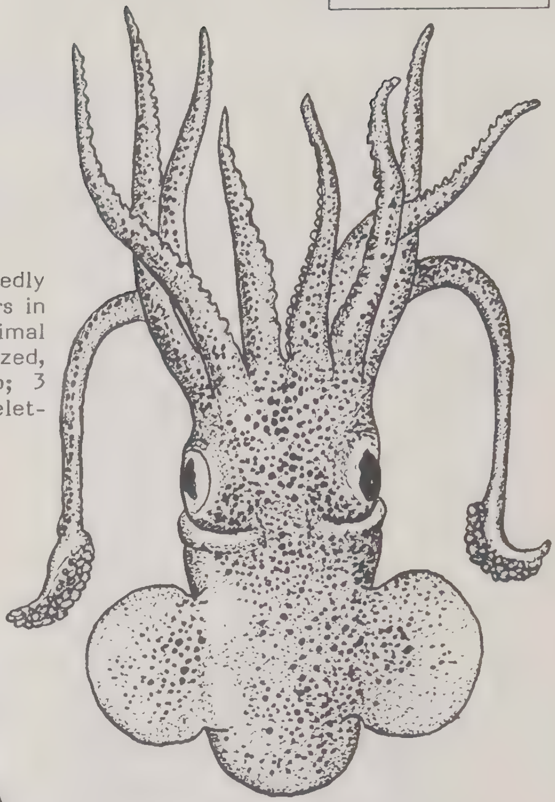
Sepiola rondeleti Leach, 1817

SEPIOL Sepiol 1

Sepiola rondeleti Leach, 1817, Zool.Misc., 3(30):140.

Synonymy : None.

FAO Names : En - Dwarf bobtail
Fr - Sépiole naine
Sp - Globito



dorsal view

Diagnostic Features : Ventral margin of mantle markedly produced anteriorly. Tentacular clubs well developed, 8 suckers in the transverse rows, well developed, markedly enlarged in proximal part of dorsal longitudinal rows. Left dorsal arm (I) hectocotylized, blunt, laterally compressed, strongly curved laterally into a loop; 3 slightly enlarged suckers at base followed by a large, swollen, eyelet-like bulb; suckers of dorsal row much larger than those of ventral row. Light organs ear-shaped, attached laterally to ink sac. Gladius rudimentary. Colour: ventral margin of mantle with a dense border of chromatophores; outer surface of tentacular clubs heavily pigmented with chromatophores.

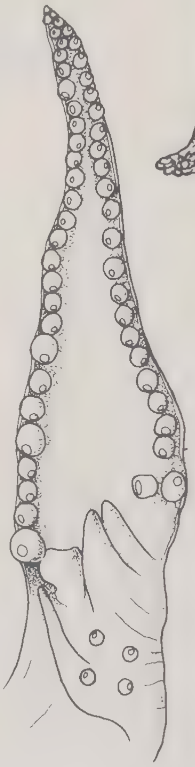
Geographical Distribution : Throughout the Mediterranean; in the eastern Atlantic, it extends from the North Sea to Senegal.

Habitat and Biology : An epibenthic species occurring from very shallow waters down to about 450 m depth over sandy and muddy bottoms. It is common in Posidonia seaweed beds (down to about 35 m). In the western Mediterranean, the spawning season extends from March through November. Longevity is estimated at 1½ years.

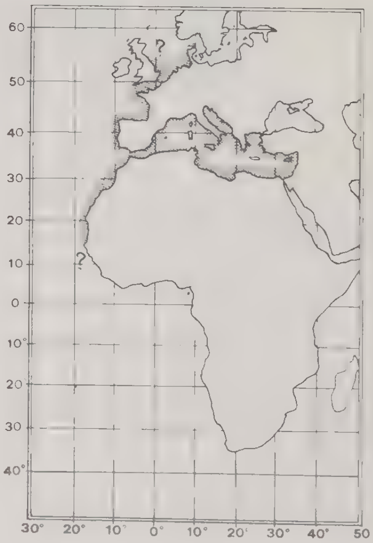
It feeds on crustaceans and small fishes.

Size : Maximum mantle length 6 cm; common to 4 or 5 cm. All females above 3 cm mantle length are mature.

Interest to Fisheries : Caught with purse seines, drift nets and occasionally with bottom trawls. The flesh is very tasty though difficult to preserve. Separate statistics are not reported for this species.



left arm I
of male
hectocotylized



Local Names : ALGERIA: Poulpe sèche, Sepietta, Sépiole, Seppiolo; FRANCE: Anchou souchot, Bougie, Glaouchau, Sepieta, Sépiole, Sepion, Sepiou, Sepioun, Supieta, Tantena; GERMANY (FR): Kleiner Tintenfisch; GREECE: Soupitza; ITALY: Babuccia, Babbucciedda, Beccaficu, Calamaretto, Cape'e chiuove, Malnascui, Porpo-seppia, Scarpetta, Scartoccio, Seccetella, Sepietta, Sepiola, Sepiolina, Seppetta, Sponce currienti, Totanino, Tutariedde, Zotoleto, Zotolo; MALTA: Dakkra; MONACO: Süpiola; MOROCCO: Sépiole; NETHERLANDS: Dwerginktvis; PORTUGAL: Pota, Zula; ROMANIA: Sepiola; SPAIN: Choco, Fotesa, Frenética, Globito, Morralet; TURKEY: Derinsu sübyesi; YUGOSLAVIA: Bobic.

Literature : Mangold-Wirz (1963, biology, western Mediterranean); Fischer (ed., 1973, Species Identification Sheets, Mediterranean and Black Sea, fishing area 37).

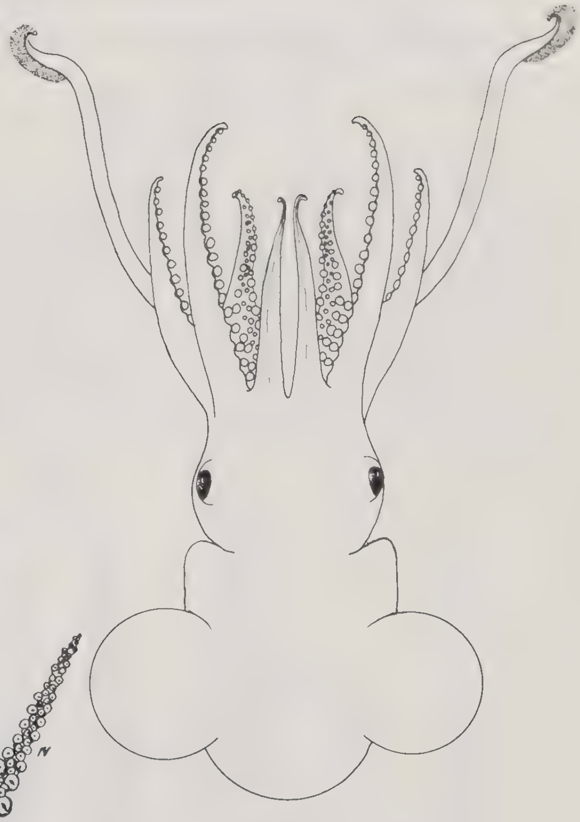
Euprymna berryi Sasaki, 1929

SEPIOL Eup 1

Euprymna berryi Sasaki, 1929, J.Coll.Agri., Hokk., 20:143.

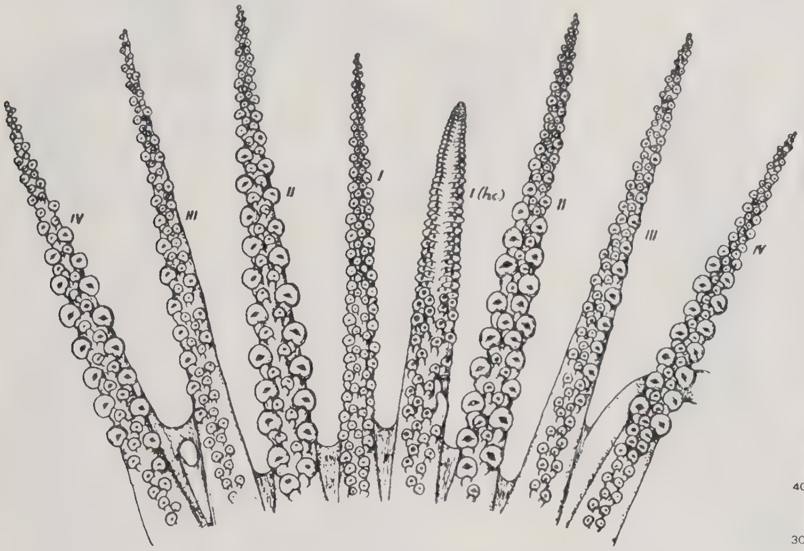
Synonymy : None.

FAO Names : En - Double-ear bobtail
Fr - Sépiole colibri
Sp - Sepiola colibrí

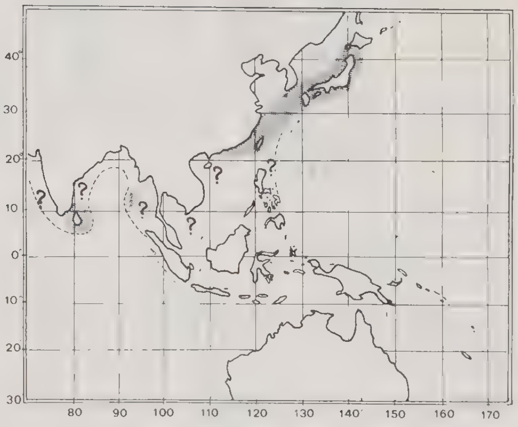


dorsal view

Diagnostic Features : Tentacular clubs with swimming keel extending proximally along stalk; suckers extremely numerous, minute, elongated, goblet-shaped. Arm suckers in 4 longitudinal rows, those on lateral (dorsal and ventral) rows of arms II and IV greatly enlarged, globular. Left arm I hectocotylized, much thicker, shorter and more blunt than right arm I; suckers normal on proximal half, in 2 to 4 oblique rows; at 1/4 arm length 2 prominent, suckerless, nipple-like papillae in ventral sucker row; distal half of arm with 70 to 80 closely-packed, palisaded papillae in 2 to 4 rows, with minute rudimentary suckers.



arms of male (oral view)



Geographical Distribution : Along the coasts of China (south to Hong Kong and Japan), Andaman Islands and Sri Lanka.

Habitat and Biology : A pelagic coastal species occurring down to 60 depth. Females grow much larger than males.

Size : Maximum mantle length 3 cm in males, 5 cm in females.

Interest to Fisheries : Currently not exploited commercially in Hong Kong, but reported to be consumed locally in China.

Local Names : CHINA: Leung yee jai.

Remarks : The species has been reared successfully in aquaculture experiments (Choe, 1966).

Euprymna morsei (Verrill, 1881)

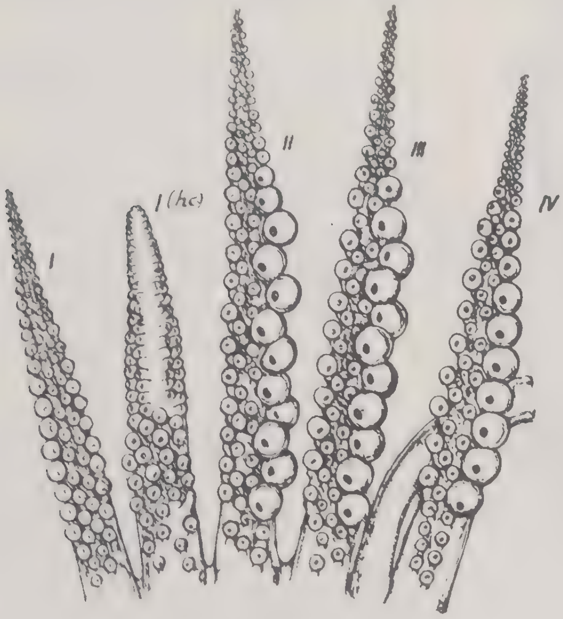
SEPIOL Eup 2

Inioteuthis morsei Verrill, 1881, Trans.Conn.Acad.Sci., 5(6):417.

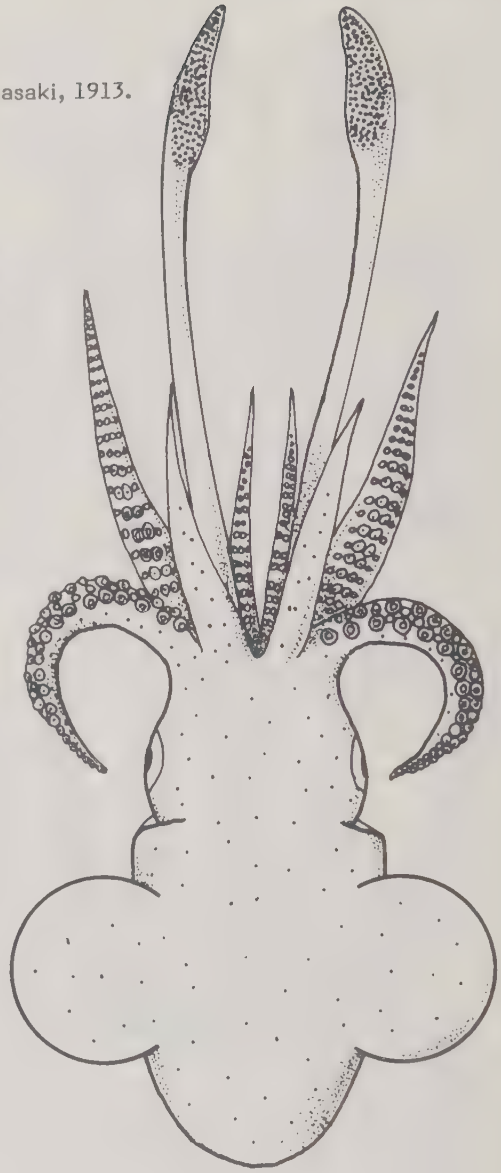
Synonymy : Inioteuthis morsei Verrill, 1881; Euprymna similis Sasaki, 1913.

FAO Names :
En - Mimika bobtail
Fr - Sépiole mimika
Sp - Sepiola mimika

Diagnostic Features : Tentacular clubs with swimming keel extending along stalk; suckers extremely numerous, minute, crowded, shallow, globular and on very long stalks; dactylus naked. Arms with 4 rows of suckers, 2 rows proximally and distally; suckers uniformly small in females, enlarged in ventral row of arms II, III, IV in males. Left arm I hectocotylized, shorter, thicker, more blunt than right arm I; suckers in proximal third normal, in 2 to 4 oblique rows; in ventral row near base are 1 or 2 small nipple-like papillae, occasionally with a minute sucker; distal 2/3 of arm with tightly packed, palisaded, compressed papillae (modified sucker stalks) in 2 to 4 rows, ending in minute toothed suckers with elongate apertures.

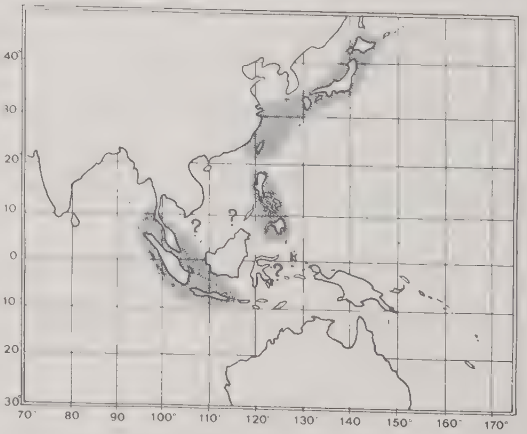


arms of male (oral view)



dorsal view

Geographical Distribution : Western Pacific: Malaysia, Indonesia, the Philippines and China; northward through the East China Sea and throughout Japan.



Habitat and Biology : A small benthopelagic species, found in coastal waters over sandy bottoms on which it spawns; the eggs are small.

Size : Maximum mantle length 4 cm.

Interest to Fisheries : Currently of low commercial value, but sometimes utilized locally as food.

Local Names : JAPAN: Dangoika, Hidokoika, Jikoika, Mimiika.

Literature : Tomiyama & Hibiya (1978).

Sepietta oweniana (Orbigny, 1840)

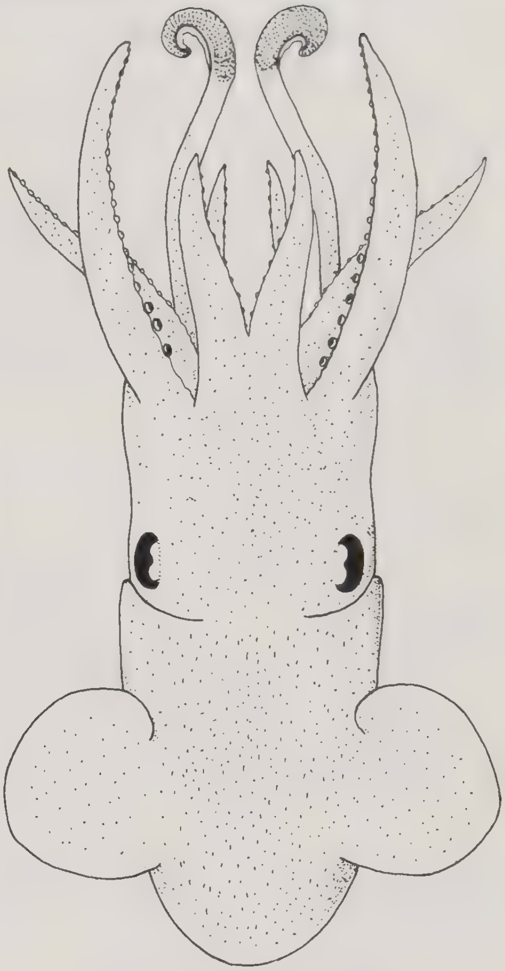
SEPIOL Sepiet 1

Sepiola oweniana Orbigny, 1840 (in 1834-1848), *Hist.Nat.Ceph,Viv.Foss.*, 229.

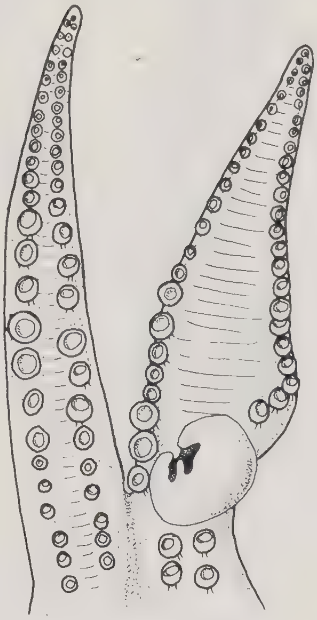
Synonymy : *Sepiola oweniana* Orbigny, 1840.

FAO Names :
En - Common bobtail
Fr - Sépiole commune
Sp - Sepieta común

Diagnostic Features : Mantle blunt, bullet-shaped. Fins with a slight lateral angle and pronounced anterior lobes. Tentacular clubs with about 32 very minute, subequal suckers in transverse rows (giving a velvety appearance). Left arm I hectocotylized by 4 small, normal suckers at base, followed by a fleshy transverse swelling with a long, hook-like, inward-curved lateral papilla, a deep cleft medial to papilla, a flask-like rugose bulb, and a swelling at the dorsal edge; first 2 suckers in dorsal row distal to swelling greatly enlarged, followed by 3 smaller suckers, then 2 enlarged, then gradually decreasing suckers to tip; ventral rows with moderately enlarged suckers; a broad scoop-like depressed area lies between the sucker rows.

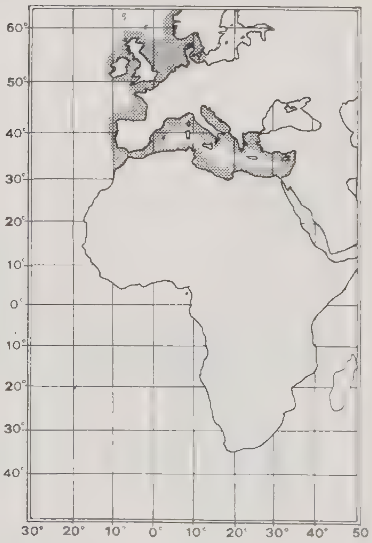


dorsal view



arms I of male, oral view
left arm (see arrow)
hectocotylized

Geographical Distribution : Northeast Atlantic: Norway (northern limit undetermined) to Morroco and the Mediterranean Sea.



Habitat and Biology : A benthopelagic species found over muddy bottoms over the shelf and the upper slope, ranging in depth from about 50 to over 600 m. In the North Atlantic most common from 50 to 100 m depth and in the Mediterranean from 100 to 400 m. In the Mediterranean, onshore migrations of large individuals have been observed in late winter, when deep water temperatures are higher than those at the surface. These spawn in spring and early summer in relatively shallow, coastal waters, induced by an increase in water temperatures. Smaller sized bobtail squids ascend later in the year and do not spawn before autumn. The entire spawning period thus extends from March to November. The eggs are deposited on ascidians (*Microcosmus*) and other substrates. At 20°C they take about 30 days to hatch.

Size : Maximum mantle length 4 cm in females, about 3.5 cm in males.

Interest to Fisheries : Undetermined.

Local Names :

Literature : Mangold-Wirz (1963, biology, western Mediterranean).

Rondeletiola minor (Naef, 1912)

SEPIOL Rond 1

Sepietta minor Naef, 1912, Zool.Anz., 39(7):267.

Synonymy : Sepietta minor Naef, 1912.

FAO Names :
En - Lentil bobtail
Fr - Sépiole bobie
Sp - Rondeletiola

Diagnostic Features : Mantle blunt, bullet-shaped. Fins small, round, with blunt lateral angles. Tentacular clubs with about 16 small, uniform suckers in each transverse row. Ventral arms with normal biserial suckers to apex; left arm I hectocotylized, with 3 small suckers at base, and a large, swollen, transverse, hood-shaped papilla with small accessory lateral papilla; suckers distal to the papilla greatly enlarged in the dorsal row to the tip, in the ventral row only about the proximal half of the suckers are enlarged; the two rows not widely separated.

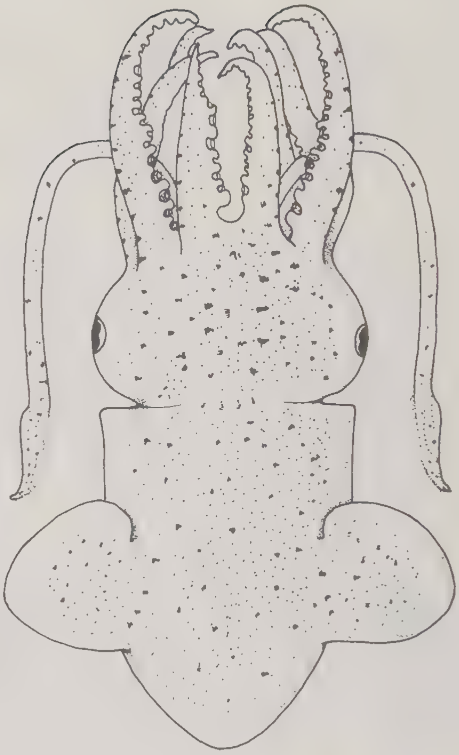
Geographical Distribution : Mediterranean Sea and Eastern Atlantic (Portugal, southern limit undetermined).

Habitat and Biology : A demersal species inhabiting mud bottoms between 80 and 400 m depth.

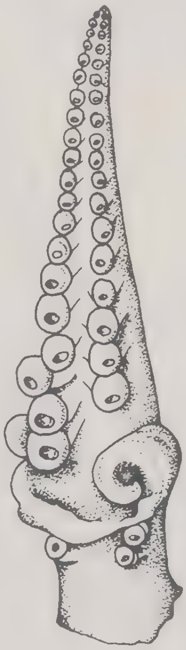
Size : Maximum mantle length approximately 4 cm.

Interest to Fisheries : Undetermined.

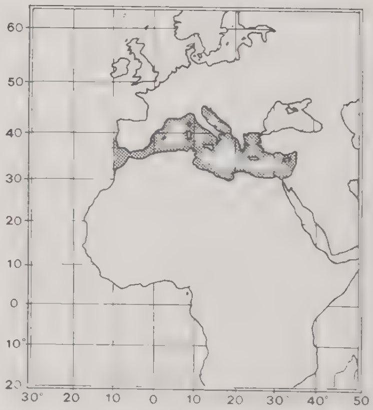
Local Names :



dorsal view



left arm I of male hectocotylized



Rossia antillensis Voss, 1955

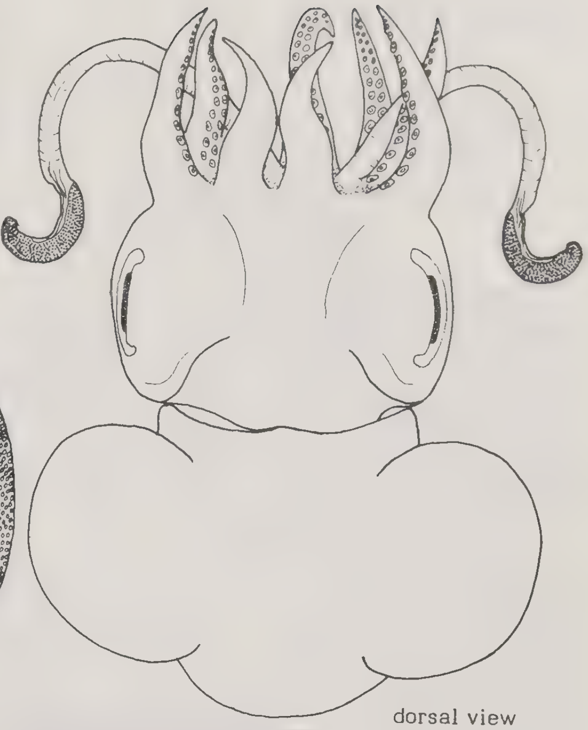
SEPIOL Ross 2

Rossia antillensis Voss, 1955, Bull.Mar.Sci., 5(2):86.

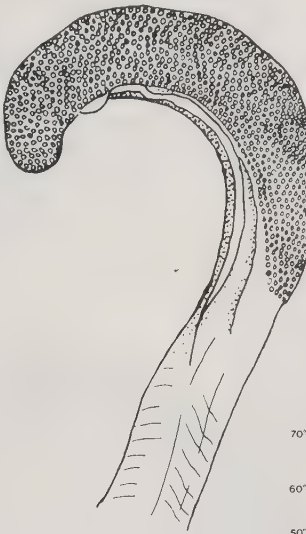
Synonymy : None.

FAO Names :
En - Antilles bobtail
Fr - Sépiole mignonne
Sp - Globito antillano

Diagnostic Features : The largest western Atlantic Rossia. Mantle sac-like, flabby. Fins 80 to 90% of mantle length, 1 2/3 to 2 times wider than mantle length. Head wider than mantle. Tentacles short, stout; clubs not expanded but with a well-developed swimming keel extending the length of the club to just proximal of suckers; 30 to 40 extremely minute, numerous suckers in transverse rows. Arm suckers in 2 rows, smaller in females, somewhat enlarged in mid-section in males; both arms I hectocotylized: 6 proximal pairs of suckers small, followed by 6 pairs enlarged to 2 times the diameter of the basal pair; distal suckers much reduced; a thick, fleshy pad extends from 3rd to 8th sucker along ventral margin (protective membrane) of each arm I.



dorsal view



tentacular club

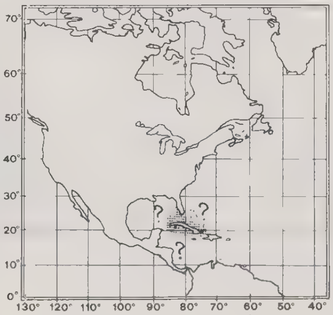
Geographical Distribution : Caribbean Sea: Cuba, Dry Tortugas and western Florida.

Habitat and Biology : A deep-living demersal species; depth range undetermined (only records: 540 to 700 m).

Size : Maximum mantle length 7.5 cm.

Interest to Fisheries : Undetermined.

Local Names :



Rossia bullisi Voss, 1956

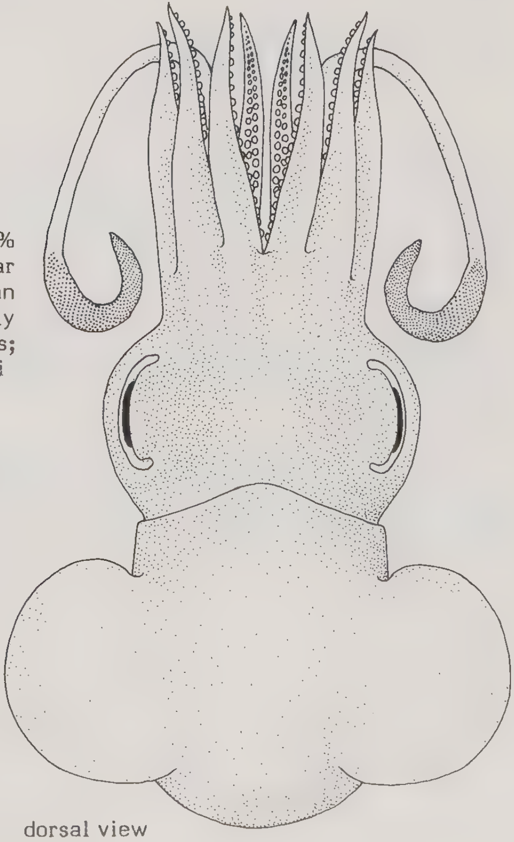
SEPIOL Ross 2

Rossia bullisi Voss, 1956, Bull.Mar.Sci., 6(2):101.

Synonymy : None.

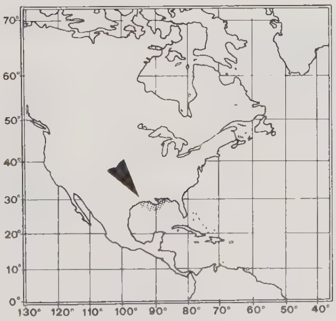
FAO Names : En - Bully bobtail
Fr - Sépiole bouledogue
Sp - Globito cabezudo

Diagnostic Features : Mantle stout, saccular. Fins 65 to 75% of mantle length, $1\frac{1}{2}$ times wider than mantle length. Tentacular clubs long, slightly expanded, with swimming keel slightly longer than club; 10 to 12 minute suckers in transverse rows. Arms relatively long, subequal, suckers in 2 rows, smaller in females than in males; both arms I hectocotylized, the ventral protective membrane modified, expanded and running along full length of arm.



dorsal view

Geographical Distribution : Northern Gulf of Mexico.



Habitat and Biology : A deep-living demersal species; depth range undetermined (only record is about 400 m).

Size : Maximum mantle length 4.5 cm.

Interest to Fisheries : Undetermined.

Local Names :

Rossia macrosoma (Delle Chiaje, 1829)

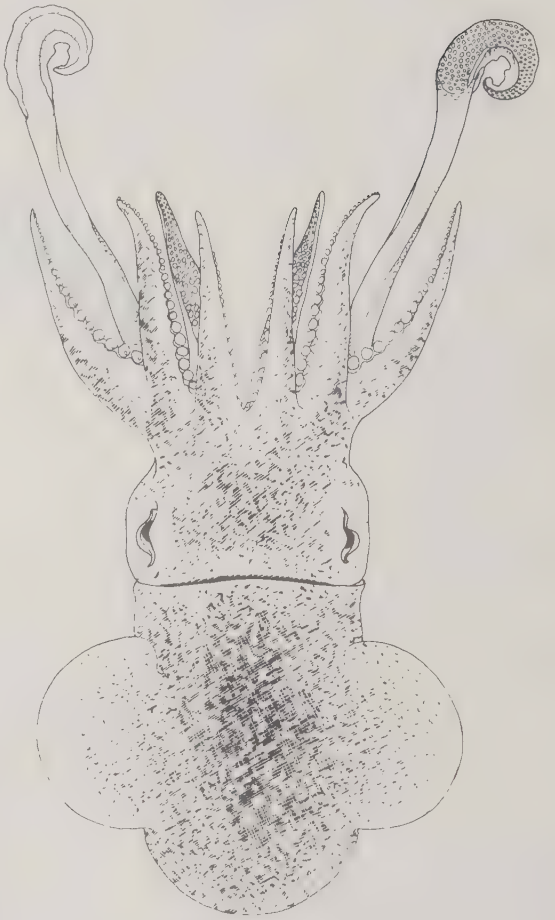
SEPIOL Ross 1

Sepiola macrosoma Delle Chiaje, 1829, *Mem.Animali Vert.Napoli*, 1:11.

Synonymy : *Sepiola macrosoma* Delle Chiaje, 1829.

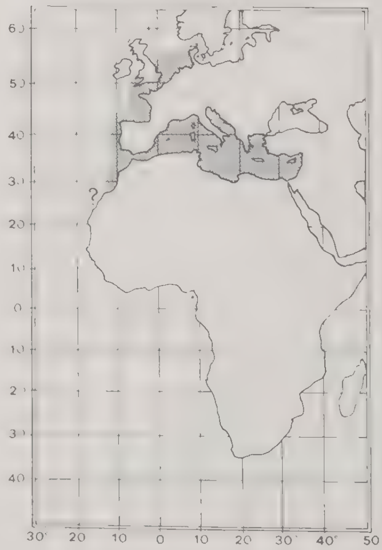
FAO Names : En - Stout bobtail
Fr - Sépiole melon
Sp - Globito robusto

Diagnostic Features : Dorsal mantle border not fused to head. Orbital pores open. Tentacular clubs with more than 8 subequal suckers, all much smaller than arm suckers, in transverse rows. Arms III and IV united by a broad web; both arms I (dorsal) hectocotylized by decrease in size of large basal suckers (in 2 rows) to smaller suckers (arranged in 4 rows in a rounded zig-zag pattern) and by the presence of a deep ridge and groove between horizontal sucker rows.



dorsal view

Geographical Distribution : Eastern Atlantic: North Sea, Mediterranean Sea, West Africa, Morocco.



Habitat and Biology : A demersal species in shallow to medium depths (between 30 and 600 m) over sandy to muddy bottoms. It carries out seasonal migrations between deeper offshore waters (winter) and shallowers coastal zones (for the rest of the year), but partitioned by size in such a way that largest individuals arrive first in spring, followed by smaller bobtail squids in summer). Maturing males (aged 7 or 8 months) carry 85 to 100 spermatophores, females (8 to 11 months) have about 120 to 150 eggs in the ovary. The spawning season extends from spring through autumn with peaks in spring and autumn corresponding to the major size classes. The eggs are deposited in clusters of 30 to 40 (egg diameter 7 or 8 mm) on shells, i.e., of *Pinna* sp. They hatch after 45 days (temperature 16°C). Females grow larger than males. Longevity is about 1 year.

Size : Maximum mantle length 8.5 cm; common between 2 and 6 cm. Length at first maturity is about 3.7 cm in males, and 6.2 cm in females.

Interest to Fisheries : A species of minor commercial importance, taken as bycatch in bottom trawls, mostly between 100 and 250 m. Its commercial value varies from one Mediterranean country to another. The flesh is tasty, but difficult to preserve. Separate statistics are not reported for this species.

Local Names : FRANCE: Sépiole; ITALY: Babbunedda, Cape e chiuove, Capo di chiodo, Pignatta, Pugnatta, Purpessa de funna, Purpo seccia, Seppiola grossa, Vurpascele; MOROCCO: Sépiole; SPAIN: Choco, Chopito, Globito.

Literature : Mangold-Wirz (1963, biology, western Mediterranean); Okutani (1980); Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part).

Rossia pacifica Berry, 1911

SEPIOL Ross 4

Rossia pacifica Berry, 1911, Proc.U.S.Nat.Mus., 40:591.

Synonymy : None.

FAO Names : En - North Pacific bobtail
Fr - Sépiole du Pacifique boréal
Sp - Globito del Pacífico boreal

Diagnostic Features : Tentacular clubs expanded, the sucker-bearing surface surrounded with protective membranes; 8 suckers in oblique rows, appearing as 5 or 6 suckers proximally, subequal in size, largest in the dorsal longitudinal rows. Arms stout, web between arms rudimentary; both arms I hectocotylized, with narrow dorsal and broad ventral protective membranes and a deep longitudinal groove and membranous fold along 2/3 of arm length; suckers reduced to 1/3 of size of those on lateral arms, in 4 rows basally, in 2 rows distally.

Geographical Distribution : Northern Pacific: Japan northward, Sea of Okhotsk, Aleutian Islands, Gulf of Alaska southward to 32°N.

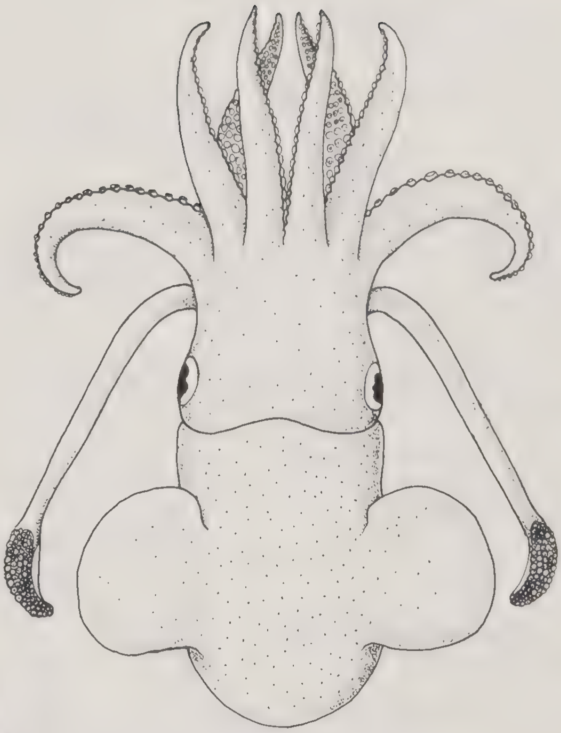
Habitat and Biology : A demersal species, Rossia pacifica occurs in depths between 100 and 600 m in the western Pacific; and in the eastern Pacific from 10 m downward (lower depth limit undetermined).

Size : Maximum mantle length 8 cm.

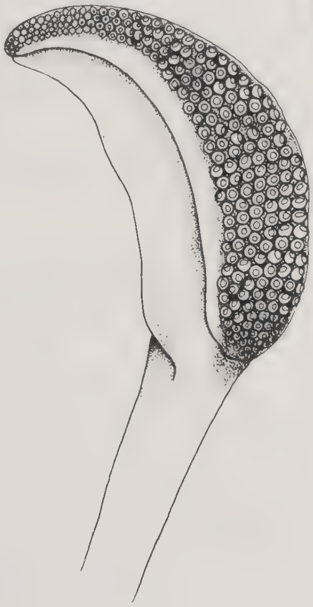
Interest to Fisheries : Trawled in large quantities off the Sanriku coast and Hokkaido, Japan. It is believed to have inferior meat quality and therefore it has low economic value even though the resource is considered to be large. The species is only locally utilized in Japan. Separate statistics are not reported for this species.

Local Names : JAPAN: Bouzuika.

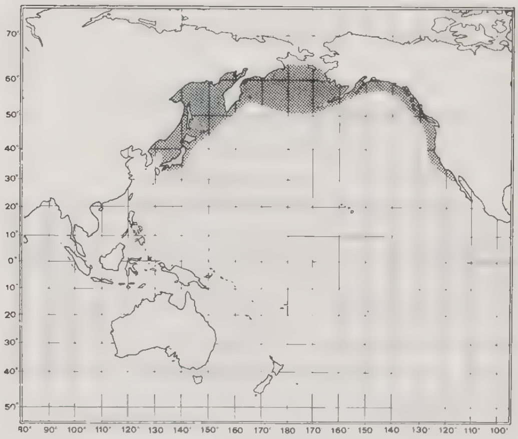
Literature : Tomiyama & Hibiya (1978, Japanese fisheries); Okutani (1980).



dorsal view



tentacular club



Rossia tortugaensis Voss, 1956

SEPIOL Ross 5

Rossia tortugaensis Voss, 1956, Bull.Mar.Sci., 6(2):103.

Synonymy : None.

FAO Names : En - Tortuga bobtail
Fr - Sépiole tortuette
Sp - Globito de Tortugas

Diagnostic Features : Tentacular clubs large; swimming keel extending from just proximal to basal suckers to the distal tip; 10 small, finely toothed suckers in oblique rows across the club. Arms relatively long; suckers in 2 rows, elongated, barrel-shaped, with narrow oval apertures without dentition.

Geographical Distribution : Gulf of Mexico: apparently restricted to the southern Dry Tortugas Islands.

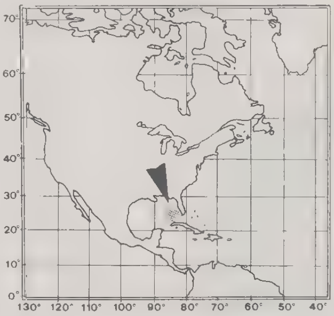
Habitat and Biology : The depth distribution of Rossia tortugaensis is still undetermined (only records are from 520 and 680 m).

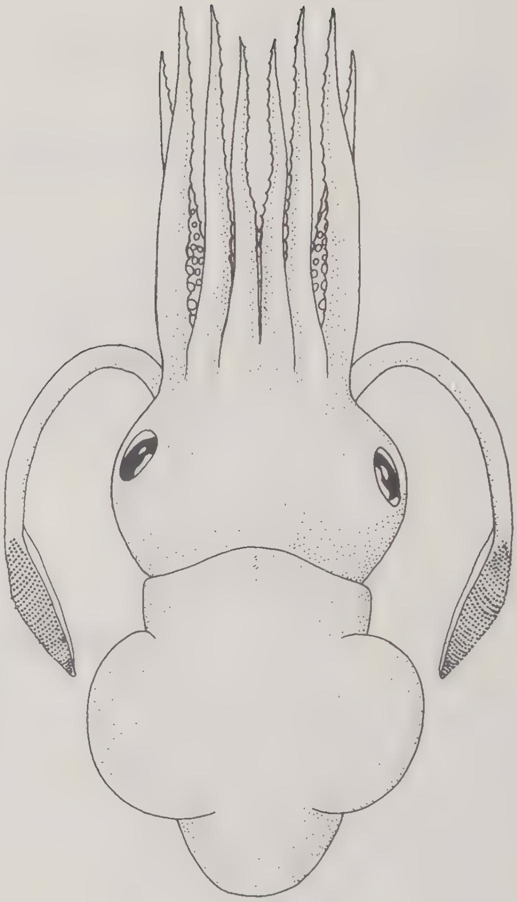
Size : Maximum mantle length 4.5 cm.

Interest to Fisheries : Undetermined.

Local Names :

Literature : Voss (1956).





dorsal view

Neorossia caroli (Joubin, 1902)

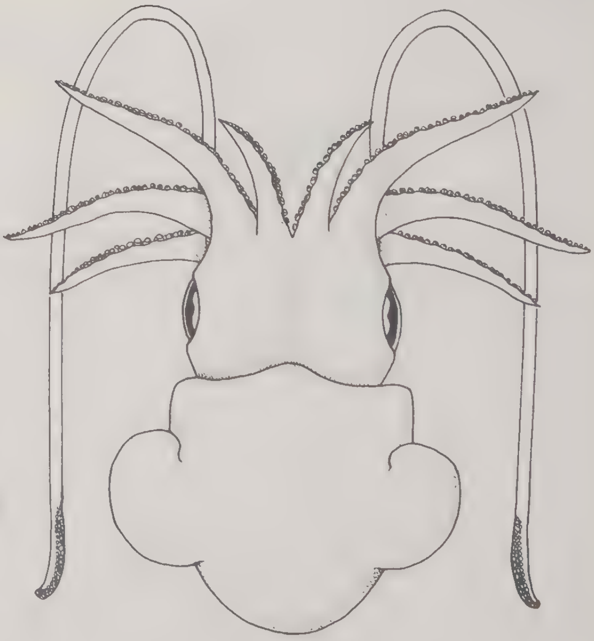
SEPIOL Neor 1

Rossia caroli Joubin, 1902, Bull.Soc.Zool.France, 27:143.

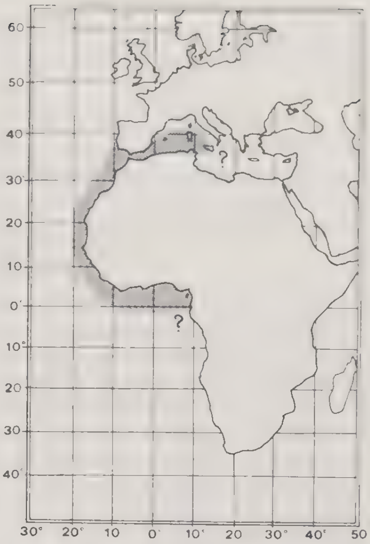
Synonymy : Rossia caroli Joubin, 1902.

FAO Names : En - Carol bobtail
Fr - Sépiole carolette
Sp - Globito carolino

Diagnostic Features : Mantle short, very broad. Fins relatively short, moderately broad, rounded. Head wide; eyes very large. Tentacular clubs not expanded, protective membrane surrounding club; swimming keel extending the length of club; 7 or 8 suckers in oblique rows across the club. Arms long, robust; suckers spherical, in 2 rows; apertures very small, rings without teeth; both dorsal arms (I) hectocotylized by reduction in size of the proximal 4 pairs of suckers and minute suckers at tips; a low crease along the ventral border of each arm; ink sac and anal flaps greatly reduced and non-functional.
dorsal view



dorsal view



Geographical Distribution : Eastern Atlantic Ocean: western Mediterranean Sea south to Gulf of Guinea.

Habitat and Biology : A demersal species; known depth range from about 300 to 1 000 m, mostly around 400 m.

Size : Maximum mantle length 5.5 cm.

Interest to Fisheries : A species of minor commercial importance, taken only as bycatch in trawls. Separate statistics are not reported for this species.

Local Names :

Semirossia equalis Voss, 1950

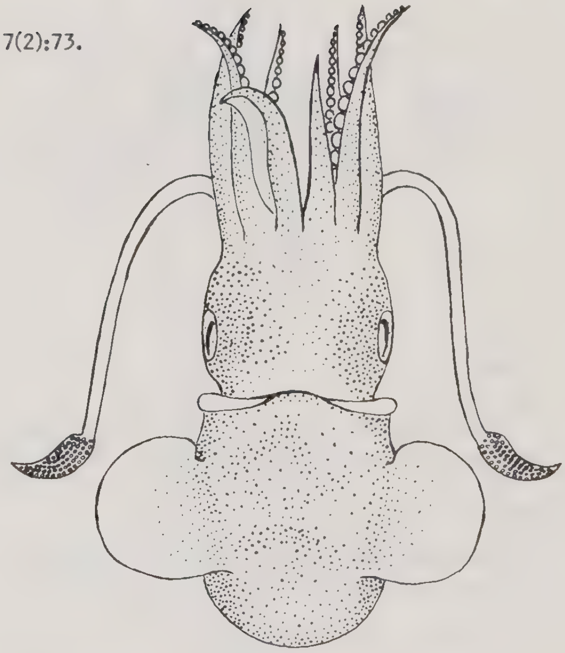
SEPIOL Semir 1

Rossia (Semirossia) equalis Voss, 1950, Rev.Soc.Malacol., 7(2):73.

Synonymy : None.

FAO Names : En - Greater shining bobtail
Fr - Sépiole cracheuse
Sp - Globito reluciente

Diagnostic Features : Fins large, broad; lobes prominent. Tentacular clubs moderately expanded, with dorsal swimming keel extending along entire length; 7 or 8 suckers in transverse rows, those of the 2 dorsalmost longitudinal rows, only slightly larger than those of ventral rows. Arms long, slender; arm suckers in 2 rows, widely spaced, enlarged in middle sections, globular, barrel-shaped, with untoothed rings. Left arm I hectocotylized; proximal 10 pairs of suckers normal-sized, followed by 4 rows of reduced-sized suckers to the tip; ventral protective membrane very broad from 3rd pair of suckers for 3/4 of arm length; sucker bases along membrane forming palisaded effect.



dorsal view

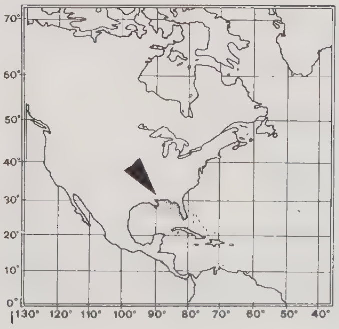
Geographical Distribution : Eastern Gulf of Mexico.

Habitat and Biology : Occurs over muddy bottoms in deeper waters from 130 to 260 m.

Size : Maximum mantle length 4 cm.

Interest to Fisheries : Undetermined.

Local Names :



Semirossia tenera (Verrill, 1880)

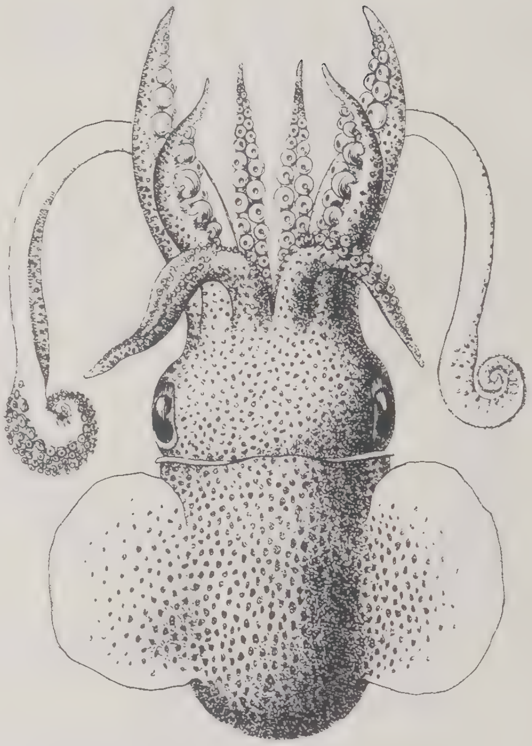
SEPIOL Semir 2

Heteroteuthis tenera Verrill, 1880, Amer.J.Sci., 20(41):392.

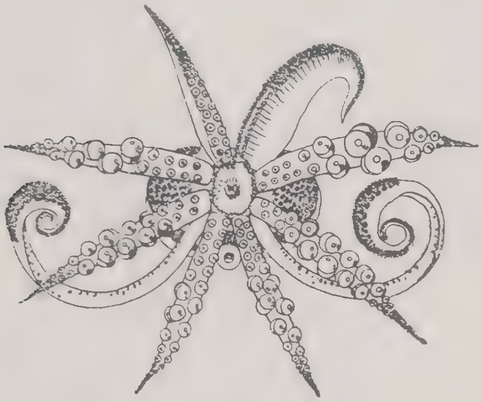
Synonymy : Rossia tenera (Verrill, 1880); Heteroteuthis tenera Verrill, 1880.

FAO Names :
En - Lesser shining bobtail
Fr - Sépiole calamarette
Sp - Globito tierno

Diagnostic Features : Mantle nearly as wide as long. Tentacular clubs slightly expanded; swimming keel extending from base to tip; 6 or 7 small suckers in the transverse rows, the dorsal ones about 2 times larger than the ventral ones; sucker rings toothed around entire margin. Arms moderately long; arm suckers much enlarged in midsection, globose, decreasing in size very abruptly near arm tip. Left arm I hectocotylized: 7 pairs of normal suckers proximally, giving way to 4 rows of suckers much reduced in size; arm attenuate near tip with suckers in 2 rows; ventral protective membrane very broad from 3rd basal pair of suckers for about 3/4 of arm length; stalks of suckers on ventral row forming a palisade, with small ridges that extend pleat-like onto oral surface of protective membrane.

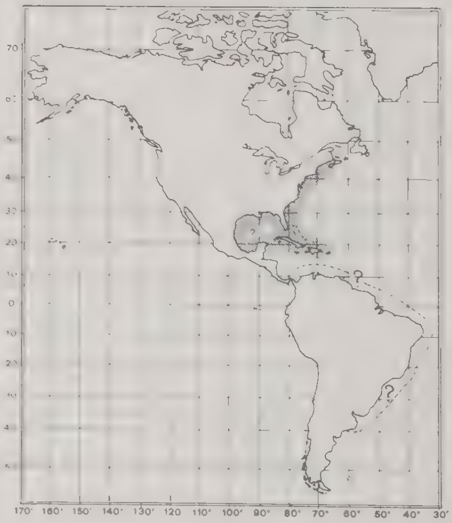


dorsal view



oral view

Geographical Distribution : Western North Atlantic: from the northern Gulf of Maine to the Gulf of Mexico and to the Caribbean Sea; possibly also present in the southwestern Atlantic, along the coasts of Brazil and Uruguay.



Habitat and Biology : Occurs demersally in deeper waters on muddy and sandy bottoms (85 to 135 m in the New England area).

Size : Maximum mantle length 5 cm.

Interest to Fisheries : Reported to be fished in the Gulf of San Matías and some localities on the south coast of Argentina (species identification needs to be verified in this area).

Local Names : ARGENTINA: Calamarcito.

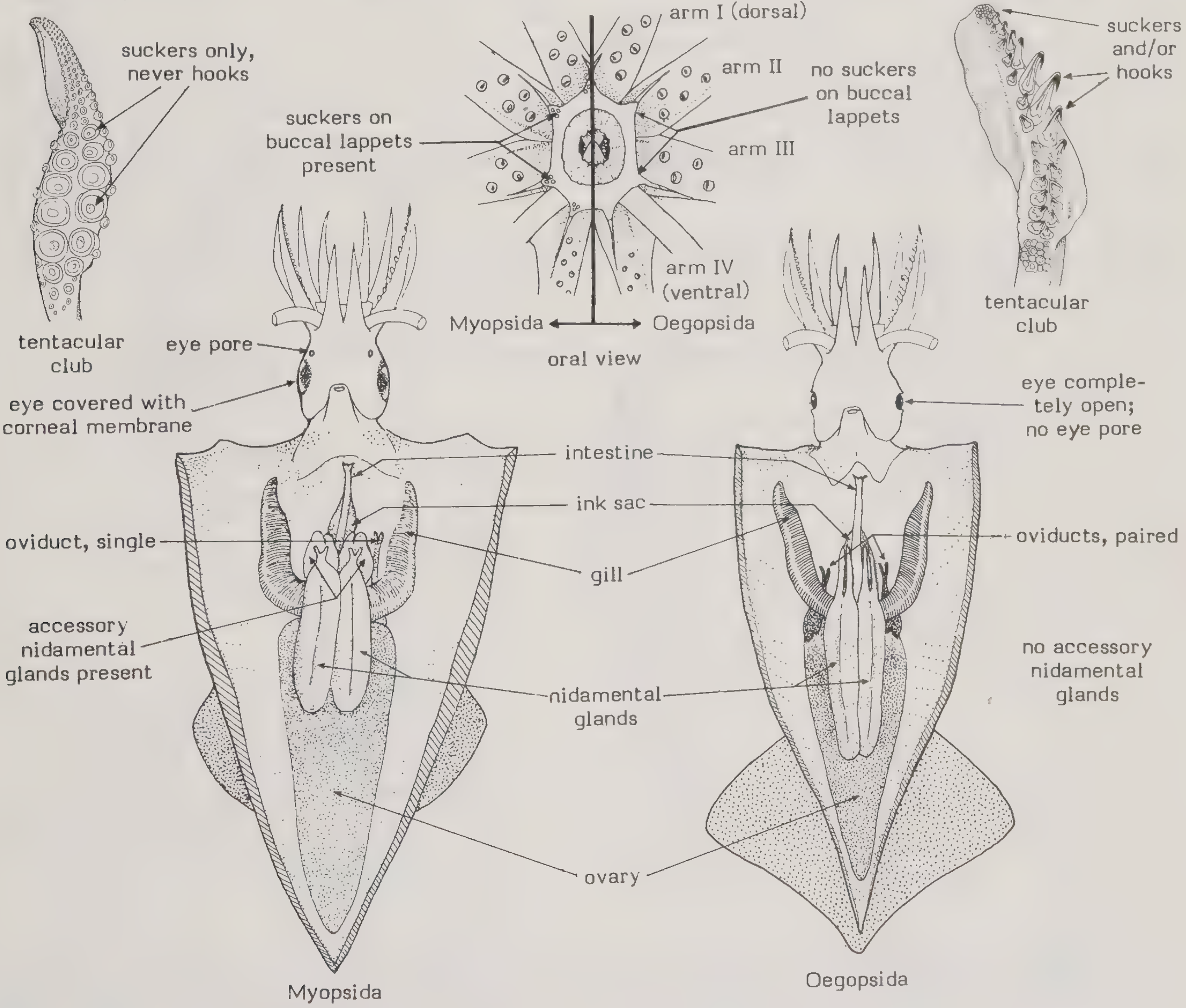
Remarks : Massay (1916) lists S. tenera from Rio de Janeiro.

4. SQUIDS (Order Teuthoidea)

Teuthoidea Naef, 1916, Pubbl.Staz.Z.Napoli, 1:14.

The origin of the Order Teuthoidea, or true squids, can be traced to the early Mesozoic (Permian/Triassic) with steady proliferation from the Jurassic through the Recent. The two Suborders, Myopsida, "covered-eyed," near shore (neritic) squids, and Oegopsida, "open-eyed", oceanic (pelagic) squids, occur in the oceans and seas of the world and form the basis of the major fisheries production. Some are demersal or epibenthic at some period of their life cycle, but most occur in the water column.

Diagnostic Features : Ten circumoral appendages, the fourth pair, the tentacles, contractile, but not retractile into pockets (occasionally tentacles secondarily lost); sucker ornamentation with chitinous rings and/or hooks. Radula teeth commonly with primary projection and a secondary cusp(s), especially on the median (rachidian) and the first lateral teeth; buccal membrane present. Olfactory organ consists of 2 projecting papillae; eye without lids (1) covered with a transparent membrane, with a minute pore (Myopsida) or (2) completely open to the sea, without a pore (Oegopsida). Gills with branchial canal between afferent and efferent branchial blood vessels. Liver consisting of a single structure. Shell (pen or gladius) internal, simple, rod- or feather-like, chitinous.


suckers only, never hooks
tentacular club
arm I (dorsal)
arm II
arm III
arm IV (ventral)
suckers on buccal lappets present
no suckers on buccal lappets
Myopsida ← → Oegopsida
oral view
suckers and/or hooks
tentacular club
eye pore
eye covered with corneal membrane
eye completely open; no eye pore
intestine
ink sac
oviduct, single
oviducts, paired
gill
accessory nidamental glands present
no accessory nidamental glands
nidamental glands
ovary
Myopsida
Oegopsida

Suborder Myopsida Orbigny, 1845

Myopsida Orbigny, 1845, Moll.Viv.Foss., 1:237.

The suborder Myopsida comprises only two families, the small, non-commercial, Pickfordiateuthidae, not included in this catalogue, and the very speciose Loliginidae which includes 8 genera and is an important item in many industrial and small-scale fisheries. FAO's fishery yearbook reports about 120 000 metric tons in 1981 for the genus Loligo (about 9% of the world catch of cephalopods), and another 480 000 metric tons for unidentified loliginids and ommastrephids (FAO, 1983), most of which are, however, believed to be ommastrephids. All myopsids are demersal, predominantly near-shore or shelf species, frequently feeding near or on the bottom. Some species tolerate reduced salinities and estuarine situations. Many species show characteristic onshore-offshore migrations in spring and late fall respectively, overwintering in deeper waters. The spawning season often is extended with peaks in early summer and autumn. Many small eggs are encapsuled in gelatinous strings attached to shells and other substrates.

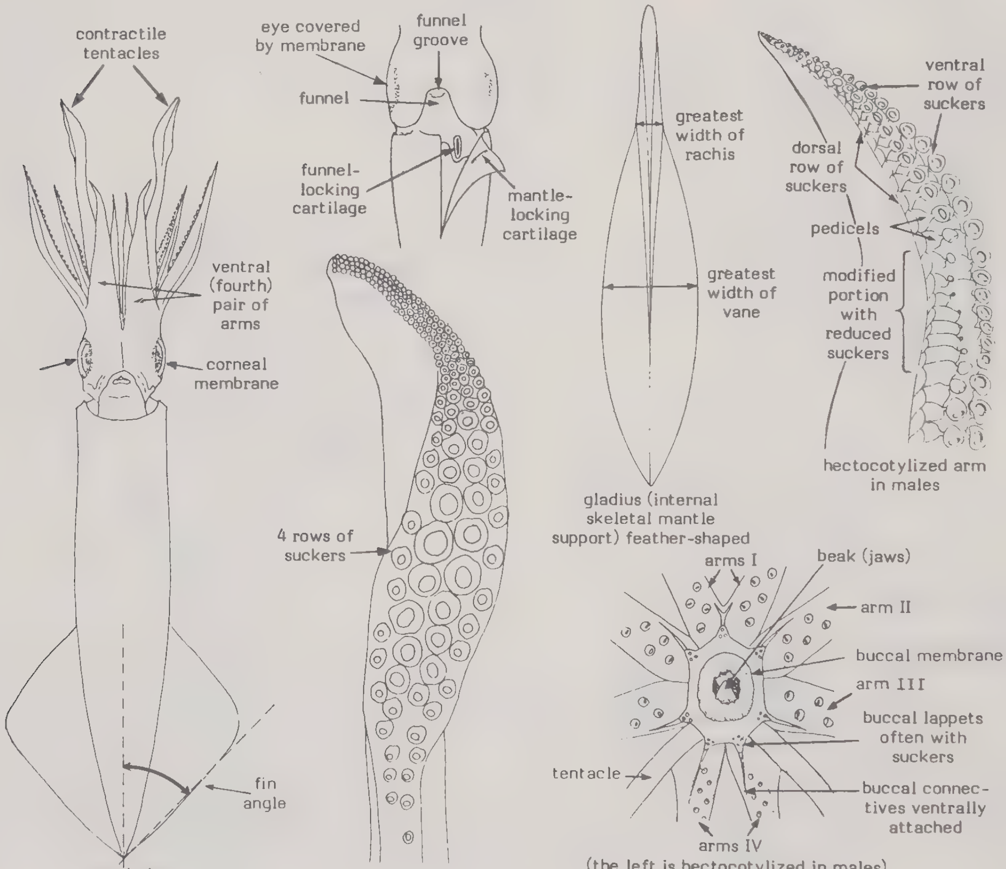
Diagnostic Features : Corneal membrane covering the eye, with a minute pore anteriorly. Arms and clubs with suckers, never with hooks. Suckers present on the buccal lappets. Females with a single gonoduct, not paired; with accessory nidamental glands.

4.1 FAMILY LOLIGINIDAE Orbigny, 1848

LOLIG

Loliginidae Orbigny, 1848, in 1834-1848, Hist.Nat.Ceph.Acet.Viv.Foss., 297.

FAO Names : En - Inshore squids
Fr - Calmars, Calmars côtiers, Casserons, Encornets
Sp - Calamares, Calamarines, Calamaretes


contractile tentacles
eye covered by membrane
funnel groove
funnel
funnel-locking cartilage
mantle-locking cartilage
ventral (fourth) pair of arms
corneal membrane
fin angle
4 rows of suckers
greatest width of rachis
greatest width of vane
ventral row of suckers
dorsal row of suckers
pedicels
modified portion with reduced suckers
arms I
beak (jaws)
arm II
buccal membrane
arm III
buccal lappets often with suckers
tentacle
buccal connectives ventrally attached
arms IV

hectocotylized arm in males

gladius (internal skeletal mantle support) feather-shaped

ventral view

tentacular club

(the left is hectocotylized in males)
diagram of oral surface of brachial crown and buccal area

Diagnostic Features : Shape variable from short and stout to long and slender. Fins terminal or marginal, but always united posteriorly; funnel-locking apparatus a simple, straight groove. Eyes covered with transparent skin (corneal membrane); buccal connectives attached to ventral borders of fourth arms; 7 buccal lappets supplied with small suckers (except in Lolliguncula and Alloteuthis); 8 arms and 2 tentacles around mouth; 2 rows of suckers on arms and 4 rows on tentacular clubs, hooks never present. Usually the left arm of the IV (ventral) pair is hectocotylized in males (used to transfer sperm packets from the male to the female); the structure of the modified portion (hectocotylus) of the arm is useful in most species as a diagnostic character (often, the suckers on the hectocotylus are reduced in size or number, or modified into fleshy papillae or flaps (lamellae), or they disappear altogether. Colour: usually reddish-brown, darker dorsally, but quite variable depending on the behavioural situation.

Geographical Distribution : Representatives of this family inhabit literally all shelf and upper slope areas of the world's oceans except the polar seas.

Habitat and Biology : Inshore squids are demersal or semipelagic inhabitants of coastal and continental shelf areas to a maximum depth of about 400 m. Several species are restricted to extremely shallow waters and some of these penetrate into brackish waters. Typically, they carry out diel movements, aggregating near the bottom during the day, but dispersing into the water column at night. Many species are positively phototactic, and hence often are captured with fishing techniques using light.

Many, but not all species are known to carry out seasonal migrations in response to temperate changes. They usually overwinter in deeper offshore waters. They migrate onshore, aggregated by size, with the largest individuals starting in spring and the smaller ones following in summer, then retreating again towards deeper waters in late autumn. Most species, except those inhabiting cold-temperate waters, have an extended spawning season with peaks in spring or early summer and in fall, corresponding to the two major size groups of spawners. Some species are known to be portion-spawners. The small eggs are encapsuled in gelatinous, fingerlike strings ("seamops") and attached to various substrates. Hatchlings resemble the adults. Those from spring and summer broods usually mature and spawn in autumn of the following year, while the offspring of autumn-spawning will tend to participate in the spring spawning in their second year of life, so that the two cycles alternate. The life span of these short-lived animals ranges between 1 and 3 years. Inshore squids are predators on crustaceans, and small and juveniles fishes.

Size : Mantle length from 2 to 90 cm.

Interest to Fisheries : Loliginids account for approximately 9% of the world cephalopod catch, and are predominantly fished by southeast Asian and Mediterranean countries which also traditionally are the major consumers. There are a few industrial fisheries directed at these species, but they also are taken as bycatch in many nearshore trawl fisheries for shrimps and demersal finfish. Numerous artisanal and subsistance fisheries take inshore squids either in multispecies catches or as prime target species. Gears used include purse seines, dip nets, cast nets, encircling nets, hook-and-line, often rendered more efficient by prior light attraction with torches and lamps.

The flesh of loliginids is highly appreciated and marketed either fresh, frozen or processed into canned or dried products. Squids also are used as bait, i.e., in scombrid hook-and-line fisheries and the traditional Grand Banks troll fishery for cod conducted by the Portuguese.

Inshore squid catches by major fishing areas and countries (Source: FAO, 1983)

Fishing Area	Country or region	% of 1981 catch in the area	catches ('000 metric tons)	
			1980	1981
Loligo pealei				
Northwestern Atlantic	Italy	37.0	2 956	3 920
	Japan	41.1	6 015	4 354
	Mexico		3 188	-
	Spain		7 569	-
	USA	21.6	3 852	2 287
Loligo species				
Northeastern Atlantic (27)	France	45.1	2 563	2 037
	Spain	47.8	1 202	2 162
Eastern central Atlantic	Spain	86.0	7 606	13 680
Mediterranean and Black Sea (37)	Italy	47.5	4 558	4 170
	Spain	37.6	1 835	3 300
Eastern Indian Ocean (57)	Indonesia	22.5	915	1 059
	Thaialnd	72.3	3 624	3 402
Western central Pacific (71)	Indonesia	13.7	10 227	9 755
	Philippines	39.3	27 011	27 980
	Thailand	46.1	36 203	32 829
Total,all Loligo			127 987	119 059

F = FAO estimate

*Key to Genera :

1a. Mantle elongate or short, robust, posteriorly pointed or rounded, but never produced into an elongate, pointed tail; posterior border of fins straight, or only slightly concave, or rounded

- 2a. Fins very long, over 90% of mantle length, broad, Sepia-like, but much wider and more muscular; mantle very robust (Fig. 1) .... **Sepioteuthis**

- 2b. Fins short to moderately long, less than 90% of mantle length; mantle elongate and narrow to short and stocky

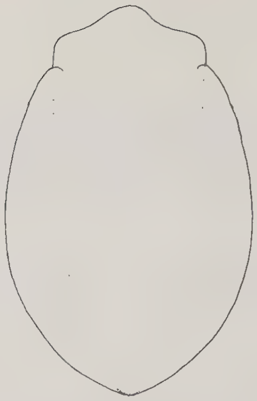
  - 3a. Fins lateral, rhombic in outline, with posterior borders straight or slightly concave; relatively long, usually over 60% of mantle length; mantle elongate, bluntly to sharply pointed (Figs 2, 3); left ventral arm (IV) hectocotylized in males .... **Loligo**

    - 4a. Vane of gladius broad, with thin, curved edges (Fig. 2a); posterior end of mantle moderately blunt (Fig. 2b); mantle not very narrow in males; fins usually less than 70% of mantle length .... **Subgenus Loligo****

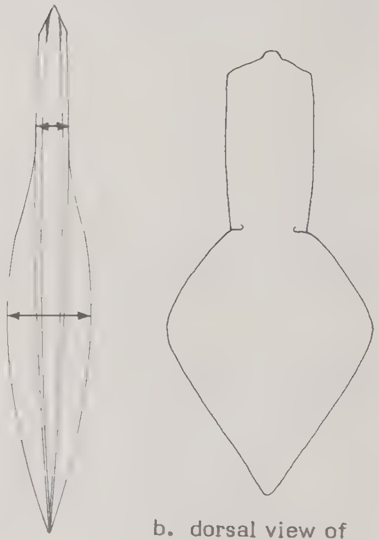
    - 4b. Vane of gladius narrow, with thickened straight edges (Fig. 3a); posterior end of mantle relatively sharply pointed (Fig. 3b); mantle very narrow in males; fins usually longer than about 70% of mantle length .... **Subgenus Doryteuthis****

  - 3b. Fins terminal, rounded (borders convex), short (less than 60% of mantle length); one or both ventral arms (IV) hectocotylized in males

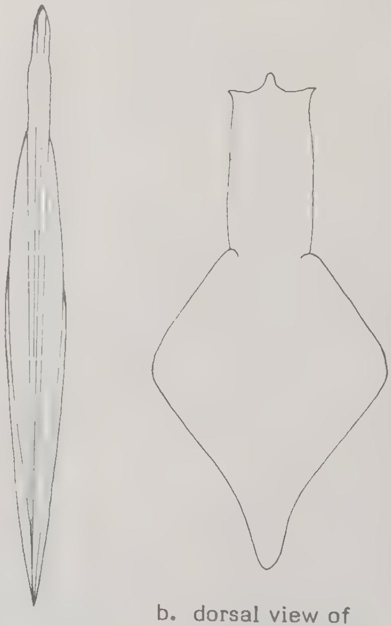
    - 5a. One ventral arm (left IV) hectocotylized in males; mantle stout, rounded posteriorly; fins 50% or more of mantle length



dorsal view of mantle and fins
Sepioteuthis Fig. 1



a. gladius
b. dorsal view of mantle and fins
Loligo, subgenus Loligo Fig. 2



a. gladius
b. dorsal view of mantle and fins
Loligo, subgenus Doryteuthis Fig. 3

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* Key refers to adults or subadult stages only

** The subgenera Loligo and Doryteuthis are considered as valid genera by some authors. Further research is required to clarify their status

6a 50% or less of ventral left arm (IV) hectocotylized by modification of suckers (Fig. 4a); fins round to elliptical; mantle very robust, muscular, bluntly rounded posteriorly; animals relatively large (Fig. 4b) .... **Lolliguncula**

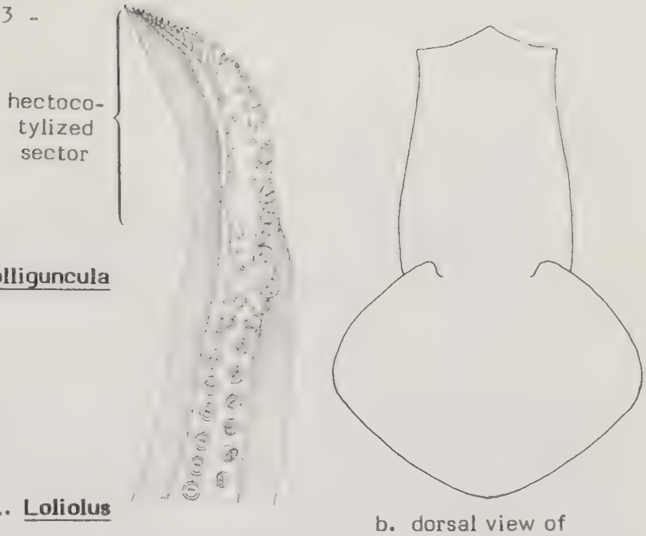
6b. Nearly entire length of left ventral arm (IV) hectocotylized by drastic modification of suckers, membranes and trabeculae (Fig. 5a); fins elliptical to broadly heart-shaped; mantle delicate, very stout, very broadly rounded posteriorly; animals small (Fig. 5b) .... **Loliolus**

5b. Both ventral arms (IV) conspicuously hectocotylized in males (Fig. 6a); mantle elongate, narrow, bluntly pointed posteriorly; fins 30 to 35% of mantle length, elliptical to heart-shaped (Fig. 6b) .... **Loliolopsis**

1b. Mantle very long, narrow, its posterior end drawn out into a long, pointed tail, especially in males posterior border or fins strongly concave, extending along tail as narrow membranes (Fig. 7)

7a. Buccal membrane with suckers; trabeculae on protective membranes of tentacular clubs equal in number to adjacent suckers (Fig. 8a) .... **Uroteuthis**

7b Buccal membrane without suckers; trabeculae on protective membranes of tentacular clubs twice as numerous as adjacent suckers (Fig. 8b) .... **Alloteuthis**

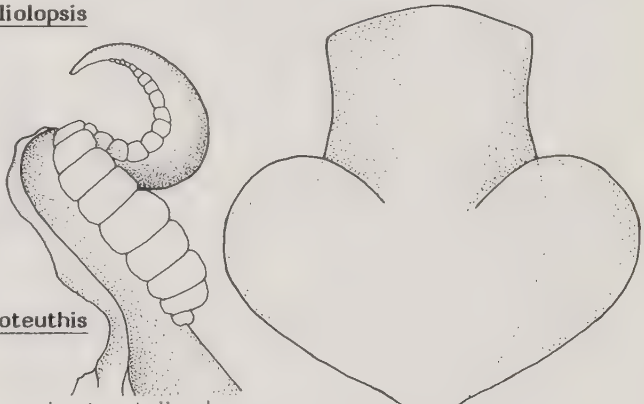


a. hectocotylized arm IV of male

b. dorsal view of mantle and fins

Lolliguncula

Fig. 4

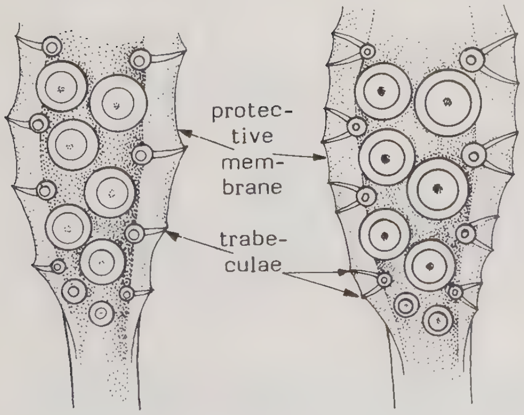


a. hectocotylized arm IV of male

b. dorsal view of mantle and fins

Loliolus

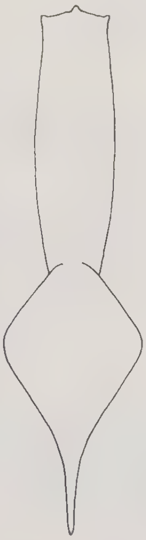
Fig. 5



base of tentacular club

a. Uroteuthis b. Alloteuthis

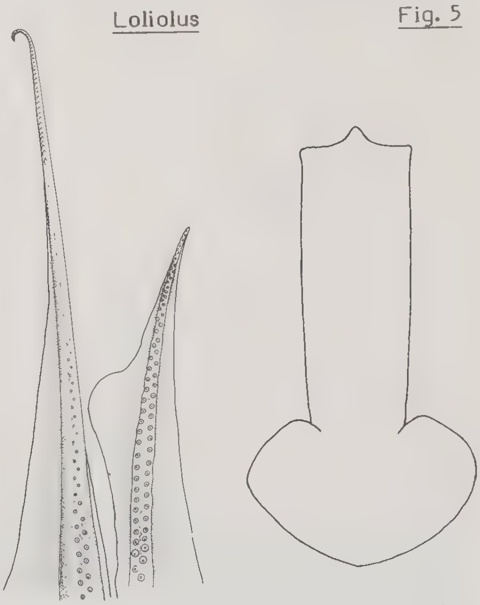
Fig. 8



dorsal view of mantle and fins

Uroteuthis

Fig. 7



a. both arms IV of male hectocotylized

b. dorsal view of mantle and fins

Loliolopsis

Fig. 6

Loligo beka Sasaki, 1929

LOLIG Lolig 7

Loligo beka Sasaki, 1929, J.Coll.Agri., Hokk., 20:121

Synonymy : Loligo sumatrensis Appellöf, 1886

FAO Names : En - Beka squid
Fr - Calmar cracheur
Sp - Calamar beka

Diagnostic Features : A relatively small species up to 7 cm mantle length; fins rhomboidal, angles rounded, length greater than 1/2 of mantle length. Tentacular clubs small, narrow; suckers small, quadriserial, those of median 2 rows on manus slightly less than 2 times the diameter of the marginal suckers; rings of suckers on manus with about 20 small, sharp, conical teeth. Arm sucker rings with 3 to 5 (usually 4) very broad, squared, plate-like teeth in distal 3/5, a single flat "tooth" in proximal 2/5; left arm IV hectocotylized in distal 2/3, with about 50 interconnected fleshy papillae (modified sucker stalks) in two longitudinal rows; those of ventral row more thickened, especially proximally; papillae on dorsal row and a few on ventral row distally bearing minute, rudimentary suckers.

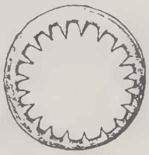
Geographical Distribution : Western Pacific; southern Japan, Taiwan (Province of China), and Hainan Island; mainland distribution unreported.

Habitat and Biology : A neritic, semipelagic species; its depth distribution is undetermined.

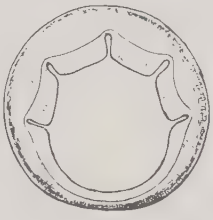
Size : Maximum mantle length 7 cm.

Interest to Fisheries : One of the four loliginid species reported in the Chinese squid catch.

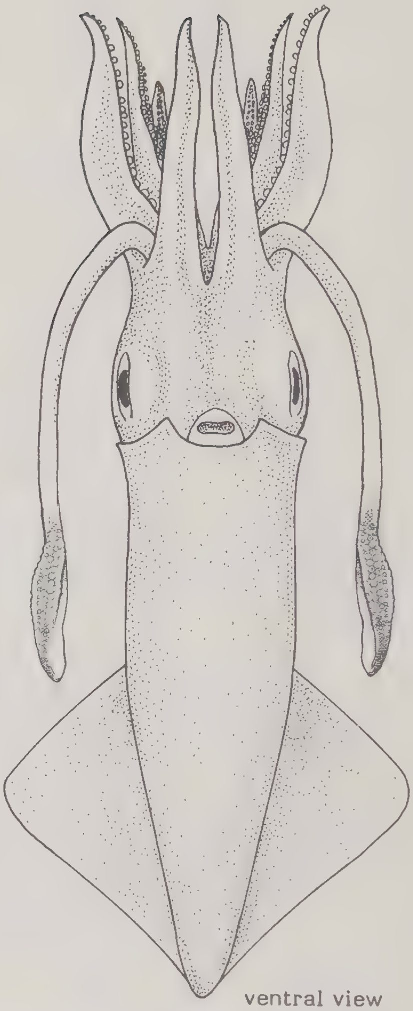
Local Names : JAPAN: Beka.



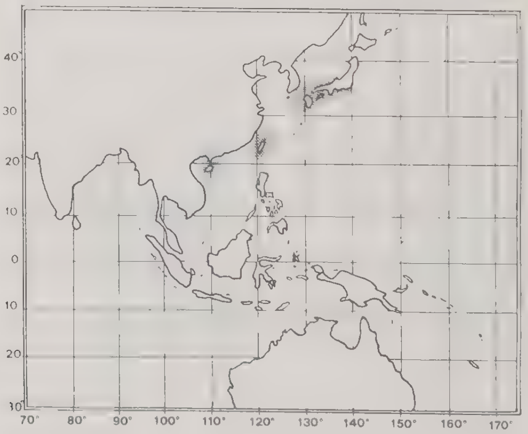
tentacular club
sucker ring



arm III
sucker ring



ventral view



Loligo (Doryteuthis) bleekeri Keferstein, 1866

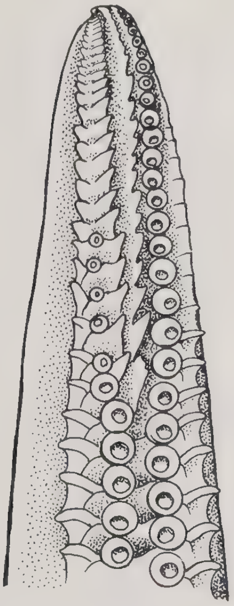
LOLIG Lolig 8

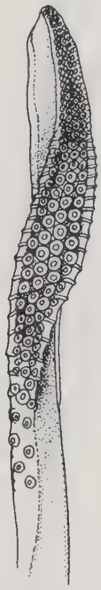
Loligo bleekeri Keferstein, 1866, Bronn's Klass.Ordn.Tier-reichs, 1862-1866:1402.

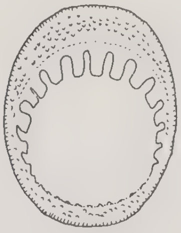
Synonymy : Doryteuthis bleekeri (Keferstein, 1866).

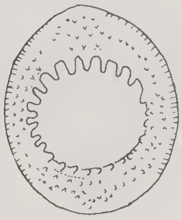
FAO Names : En - Spear squid
Fr - Calmar lancette
Sp - Calamar lanceolado

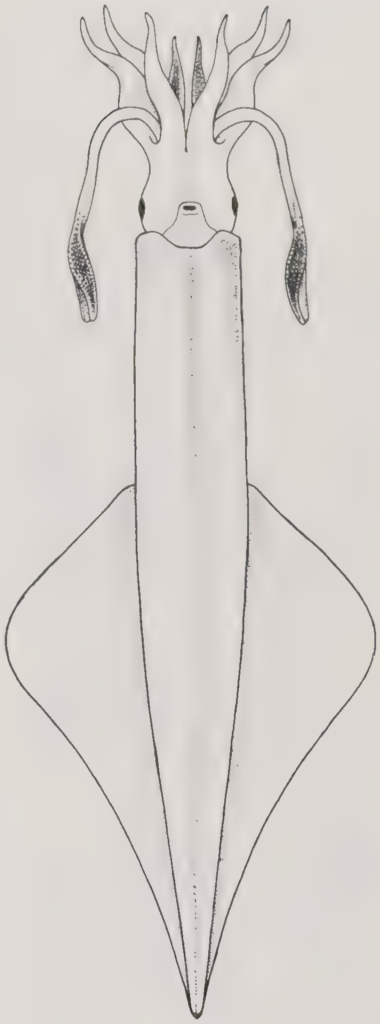
Diagnostic Features : Mantle very elongate, narrow, a fleshy ridge along ventral midline, indistinct in females. Fins large, thick, length 2/3 of mantle length. Tentacles short; tentacular clubs narrow, suckers small, nearly uniform in size, those of medial 2 rows of manus only slightly larger than marginal rows; manal sucker rings with about 30 long blunt, separate teeth, the 10 to 14 distal ones the largest. Arms very short and small in relation to body size; left arm IV hectocotylized in distal 1/3 to 1/4 where arm tip is thickened and blunt; modified sucker stalks become longer with thicker bases towards tip; suckers become very minute and rudimentary in the modified section, especially in the dorsal row, with very thickened basal papillae; dorsal basal papillae very greatly thickened, then transformed into tightly arranged, bicuspid, lamelliform flaps; a narrow, serrated membrane separates the two rows of modified sucker papillae at the tip.


left arm IV of
male hectocotylized

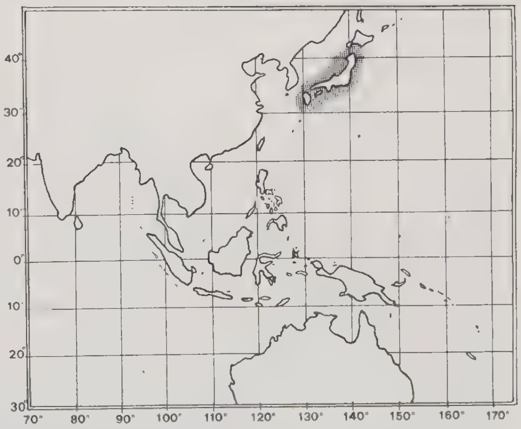

tentacular
club


largest arm III
sucker ring


largest tenta-
cular club
sucker ring


ventral view

Geographical Distribution : Japan, excluding northern half of Hokkaido; southern Korea.



Habitat and Biology : A neritic species occurring from surface waters to depths of approximately 100 m. From the offshore overwintering areas, the squids migrate onshore in early spring and spawn in shallow waters. Eggs are laid in clusters attached to various substrates, rocks, seaweeds, shells, etc.

Size : Maximum mantle length 40 cm.

Interest to Fisheries : The most extensively utilized loliginid squid in Japan. The fishery is located in the Sea of Japan and the Pacific coast northward to mid-Honshu during February to July (peak April and May); it is caught with set nets, trap nets, trawl nets and blanket nets. The feasibility of aquaculture is presently under intensive study, e.g., artificial spawning beds have been built, but the results are not yet available.

Local Names : JAPAN: Chiyoki, Sasaika, Sayanaga, Shakuhachiika, Tenashi, Teppo, Tsutsuika, Yariika.

Literature : Araya & Ishi (1974, fishery and biology, Japan; under the name Doryteuthis bleekeri); Tomiyama & Hibiya (1978).

Remarks : Some authors consider Doryteuthis a subgenus while others give it generic standing.

Loligo chinensis Gray, 1849

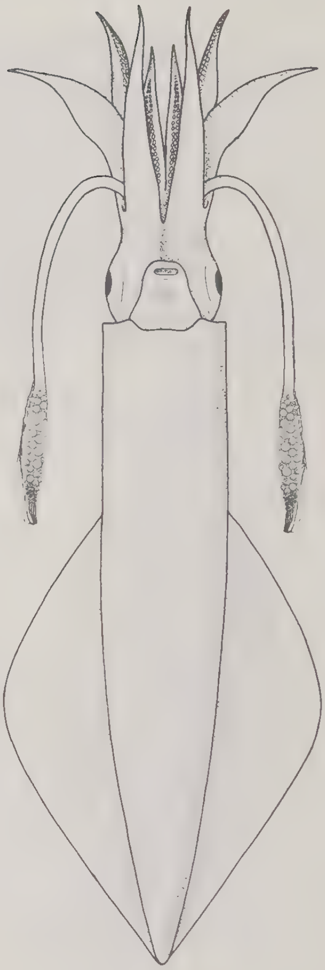
LOLIG Lolig 9

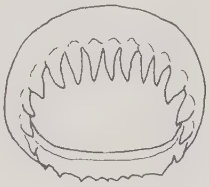
Loligo chinensis Gray, 1849, Cat.Moll.Brit.Mus., 74.

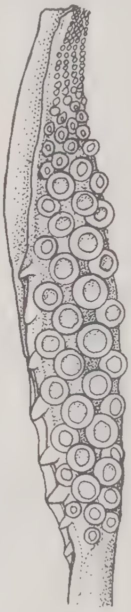
Synonymy : Loligo formosana Sasaki, 1929; Loligo etheridgei Berry, 1918.

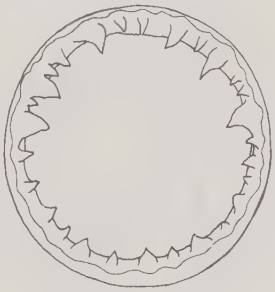
FAO Names :
En - Mitre squid
Fr - Calmar mitre
Sp - Calamar mitrado

Diagnostic Features : Mantle elongate, slender, bluntly pointed posteriorly, no longitudinal ridge on ventral midline. Fins rhombic, long, over 2/3 of mantle length. About 12 medial manal suckers of tentacular clubs enlarged to 1 1/2 times the diameter of the lateral suckers and 2 times the largest arm sucker; large rings with 20 to 30 sharp, separate teeth, 6 to 12 larger ones interspersed with 1 to 4 smaller ones. Larger sucker rings of arms II and III with 10 to 15 sharp teeth distally, with degenerate teeth or smooth proximally; left arm IV hectocotylized at distal 1/3 by modification of more than 30 suckers and stalks in each row into slender, conical papillae that remain larger in the ventral row.


ventral view


arm III sucker ring

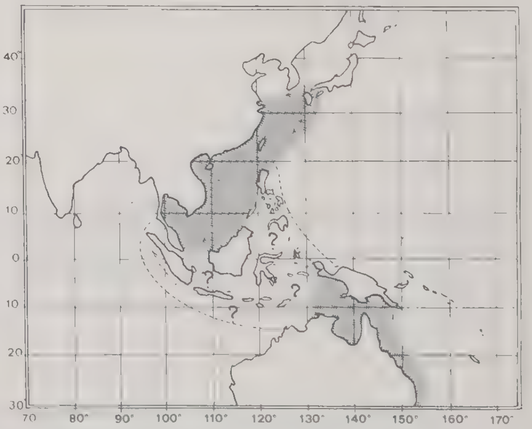

tentacular club


tentacular club sucker ring

Geographical Distribution : Western Pacific: South and East China Seas to Japan; Arafuru Sea, northeastern Australia to New South Wales.

Habitat and Biology : A neritic species ranging from approximately 15 to 170 m depth. Like many other squid, it is positively phototactic and forms large aggregations at certain periods of the year. Some spawning may occur throughout the years, but peaks are observed in spring and in fall (February to May and August to November).

Size : Maximum mantle length 30 cm.



Interest to Fisheries : Loligo chinensis is a target species or a welcome bycatch of numerous commercial and small-scale fisheries throughout its range. During summer, from July to September, it is heavily exploited off Hong Kong and reported to make up about half (2000 to 3000 tons) of the entire squid catch. It also supports seasonal fisheries in several parts of China, where it accounts for up to 90% of the loliginid catch. It is also one of the major squid species in the Gulf of Thailand, where it is taken in waters between 15 and 30 m depth and amounts to between 15 and 40% of the trawl catch. Concurrently with the decrease of finfish catches in that area, squids have become an increasingly important resource since the mid-sixties and early seventies (Sakurai, 1972). Exploratory light-lure fishing has been tried successfully on the Thai west coast. Catches in other countries boardering the Bay of Bengal are presently of minor importance. The species is also taken by Taiwanese trawlers in north Australian waters and is believed to occur in minor quantities in Indonesian, Malaysian and Philippine catches.

Loligo chinensis is taken with a variety of gears, including different kinds of bottom trawls, purse seines, dip-, and cast nets, hook-and-lines, scoop nets, and bamboo stake nets, sometimes involving light attraction with torches and lamps. It is usually marketed dried, but also fresh and frozen.

Local Names : CHINA: Tor yau yue; JAPAN: Hirakensakiika.

Literature : Tomiyama & Hibaya (1978); Okutani (1980); Chikuni (in press, resources in the Indo-Pacific Region; and references therein).

Remarks : Probably this is a wide-ranging species throughout the Indo-West Pacific region, but identification must be made of specimens from the entire suspected geographical range.

Loligo duvauceli Orbigny, 1848

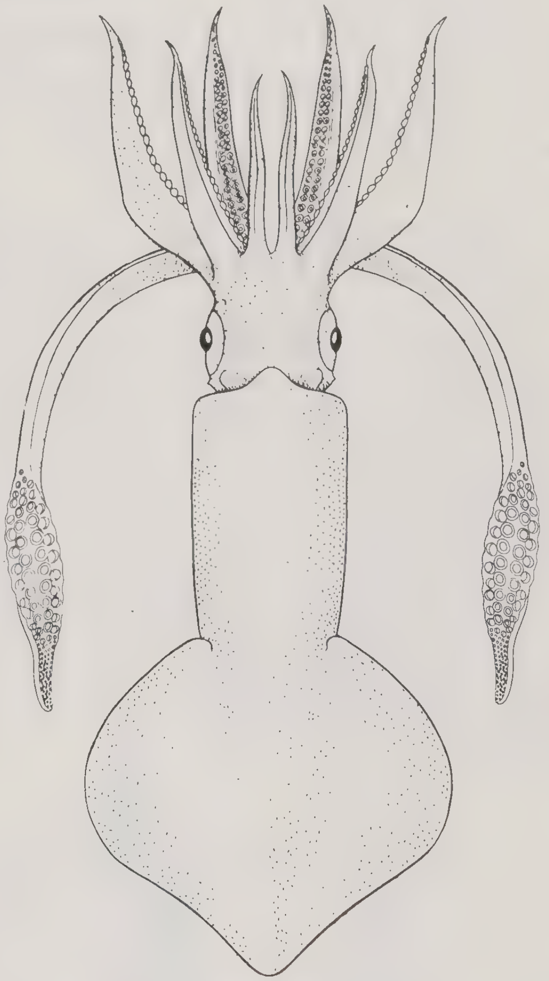
LOLIG Lolig 10

Loligo duvauceli Orbigny, 1848, in 1834-1848, Hist.Nat.Ceph.acetab., 318.

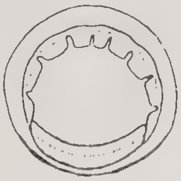
Synonymy : Loligo oshimai Sasaki, 1929; Loligo indica Pfeffer, 1884.

FAO Names :
En - Indian squid
Fr - Calmar indien
Sp - Calamar índico

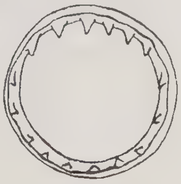
Diagnostic Features : Mantle relatively short, stout. Fins rhombic, broad, short, just over 50% of mantle length. Tentacular clubs expanded; large median manal suckers 1 1/2 times larger than marginals, with 14 to 17 short, sharp teeth around ring. Arm suckers of female of about equal size on arms II and III, rings smooth proximally, toothed with about 7 broad, blunt teeth distally (the central one pointed); in males, suckers of arm II and III greatly enlarged, with 9 to 11 broad, squared to rounded, truncate teeth in the distal 2/3 of ring, proximal 1/3 smooth; left arm IV of male hectocotylized for more than 1/2 its length, with 2 rows of large papillae, some with minute suckers on tip; ventral rows larger, turned outward, comblike; an oval photophore on each side of rectum and ink sac.



dorsal view



arm III sucker ring



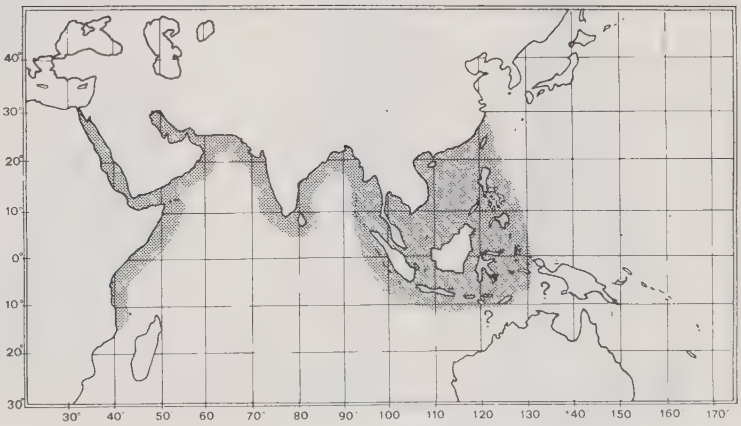
tentacular club sucker ring

Geographical Distribution : Indo-Pacific: Indian Ocean periphery, including the Red Sea and the Arabian Sea, extending eastwards from Mozambique to the South China Sea and the Philippines Sea, northward to Taiwan (Province of China).

Habitat and Biology : A neritic, shallow-water species occurring in depths between 30 and 170 m, forming large aggregations during the spawning season. Spawning occurs throughout the year, but usually peaks when water temperatures increase, i.e. in February and from June to September off Madras; from February to March, from May through July, and from September to October off Cochin. The smallest sexually mature individuals are one year old; longevity is estimated at 3 years.

This species feeds on crustaceans (such as mysids, euphausids and ostracods), fishes and squids. Cannibalism is common.

Size : Maximum mantle length 29 cm; maximum weight 1.5 kg. The size in Indian catches ranges from 6 to 28 cm; it grows larger off the Indian west coast than off the east coast. Length at first maturity is about 11 cm in males and 12 cm in females on the west coast; 7.6 cm in males and 8.6 cm in females on the east coast (Silas et al., 1982).



Interest to Fisheries : Loligo duvauceli is exploited throughout its distributional range, mainly by artisanal subsistance fisheries. Off Hong Kong it is taken by purse seiners using light in waters not deeper than 40 m, usually between May and September; in the Gulf of Thailand it is one of the target species of the trawl fishery; all along the coasts of India it regularly occurs in trawl and seine catches; and in the Gulf of Aden it is the second most important species in commercial trawl catches.

Local Names : CHINA: Chin sui yau yue, Yau jai.

Loligo edulis Hoyle, 1885

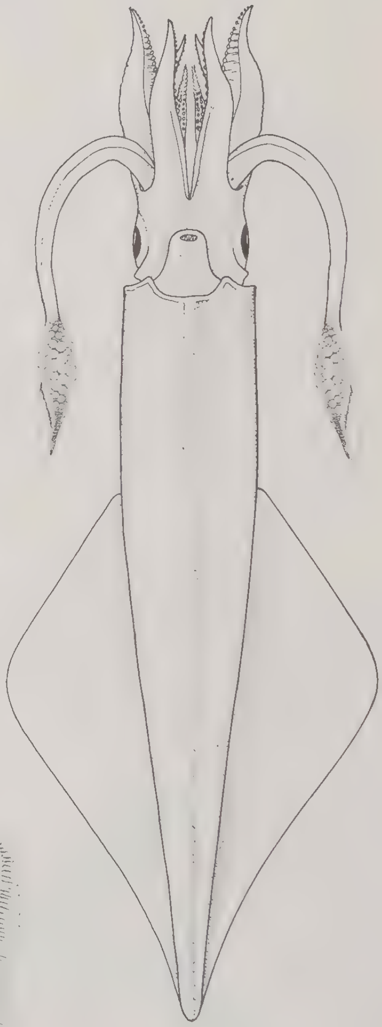
LOLIG Lolig 11

Loligo edulis Hoyle, 1885, Ann.Mag.Nat.Hist., (5)16:186.

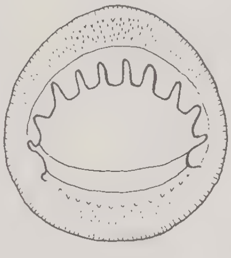
Synonymy : Doryteuthis kensaki used by some Japanese authors.

FAO Names :
En - Swordtip squid
Fr - Calmar épée
Sp - Calamar espada

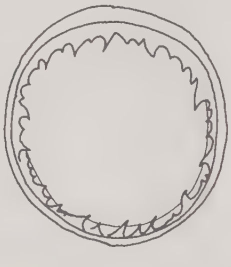
Diagnostic Features : Mantle moderately stout to elongate, slender in mature males, which have a ridge along ventral midline. Fins rhombic, attaining 70% of mantle length in adults, their posterior margin slightly concave. Tentacular clubs expanded, lanceolate; about 16 medial manal suckers $1\frac{1}{2}$ times larger than the marginals (= to largest arm suckers), with 30 to 40 sharp conical teeth, 20 to 30 small ones interspersed between 10 larger ones. Arm sucker rings with 8 to 11 distinct, squared, truncate teeth in distal 2/3, smooth or with rudimentary denticles proximally; slightly more than 1/2 of left arm IV hectocotylized by enlargement of about 50 pairs of sucker stalks into swollen papillae, each with a minute rudimentary sucker on the tip; papillae slightly larger in ventral row; a fusiform photophore on each side of rectum.



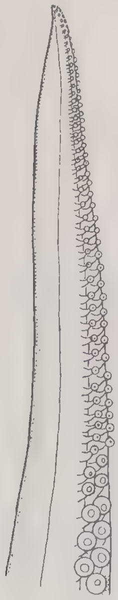
ventral view



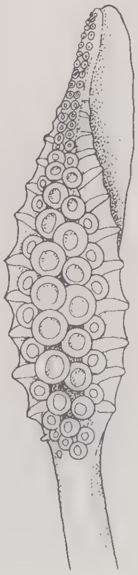
arm III sucker ring



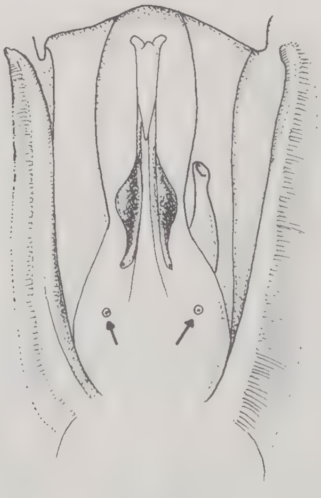
tentacular club sucker ring



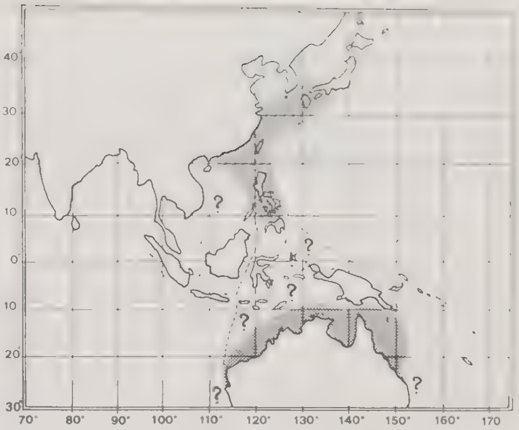
left arm IV of male hectocotylized



tentacular club



photophores on ink sac



Geographical Distribution : Western Pacific: Northern Australia, Philippine Islands, northern South China Sea to central Japan.

Habitat and Biology : A neritic species occurring in 30 to 170 m depth. It overwinters in deeper waters, migrating inshore in spring and summer forming large aggregations and spawning places on sandy bottoms in 30 to 40 m depth.

Size : Maximum mantle length 30 cm and weight 0.5 kg in Hong Kong; in other areas up to 40 cm; common size in commercial catches between 15 and 25 cm.

Interest to Fisheries : In Hong Kong, swordtip squid is the major commercial squid taken by pair trawlers from July to September. Annual landings of this species increased over the last years, amounting to 6 100 metric tons in 1979. The species also supports local fisheries in western Japan, the Philippines, and probably in Alas Straits, Indonesia. It is also reported to be taken by Chinese trawlers from Taiwan (Province of China) in Australian waters. Other gears include jigs and set nets.

The flesh of this species is of good quality and brings high prices. It is processed into a dried product (Gotosurume) and also used for sashimi (raw).

Local Names : CHINA: Tor yau yue; JAPAN: Gotouika, Kensakiika, Mawashikko (juveniles), Mehikariika.

Literature : Tomiyama & Hibiya (1978); Okutani (1980); Dunning (1982).

Remarks : Specimens of 10 to 20 cm mantle length taken in set nets south of the Aomori Prefecture in Japan, have been classified as Mehikariika (believed to be a different species) on account of the difference in both mantle and fin length. Recent studies, however, have proved that both these forms belong to the same species and that the differences are attributable to growth stages (Tomiyama & Hibiya, 1978).

Loligo edulis budo Wakiya & Ishikawa, 1921

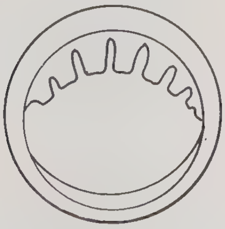
LOLIG Lolig 11a

Loligo budo Wakiya & Ishikawa, 1921, Zool.Mag.Tokyo, 33:285.

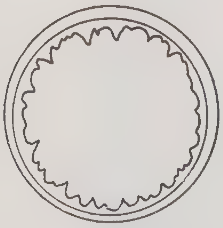
Synonymy : Loligo edulis grandipes Sasaki, 1929.

FAO Names :
En - Budo squid
Fr - Calmar budo
Sp - Calamar budo

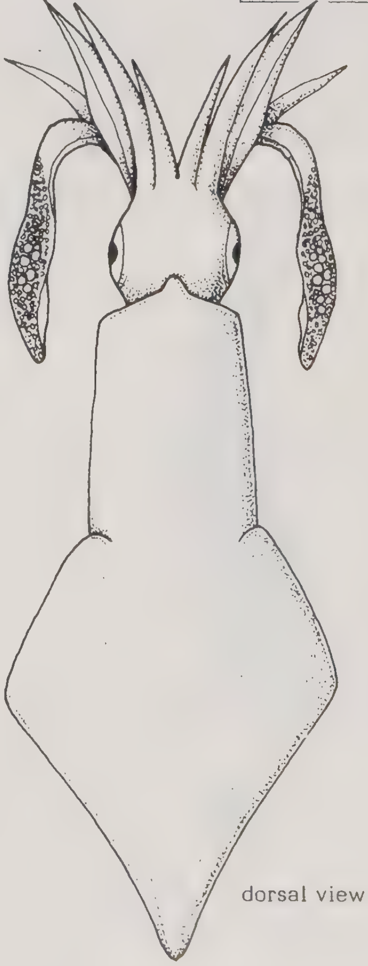
Diagnostic Features : Mantle moderately stout with a reduced ventral ridge. Fins about 60 to 65% of mantle length; rhomboidal. Head, arms and especially tentacles very much enlarged. Medial manal suckers of tentacular clubs very large, 2 times the diameter of largest suckers on arm III. Arm sucker rings with 7 to 8 large, truncate teeth graded to a smooth plate proximally.



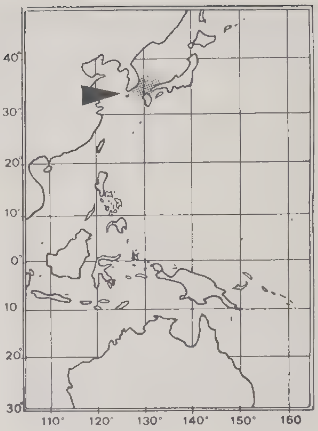
arm III
sucker ring



tentacular club
sucker ring



dorsal view



Geographical Distribution : Western Pacific in southwestern Japan Sea.

Habitat and Biology : Neritic in shallow waters, known to perform seasonal migrations. In spring, immature squids migrate inshore; mating occurs throughout summer and in early fall, while spawning takes place shortly afterwards in deeper waters. Thousands of oval-shaped eggs embedded in gelatinous tubes are attached in clusters to various substrates.

Size : Maximum mantle length 25 cm.

Interest to Fisheries : It is the object of local fisheries in the western Japan Sea, using trawl or set nets. Separate statistics are not reported. The flesh is of excellent quality and processed into Shiro-Surume.

Local Names : JAPAN: Budouika, Shiroika.

Literature : Tomiyama & Hibiya (1978); Okutani (1980).

Loligo forbesi Steenstrup, 1856

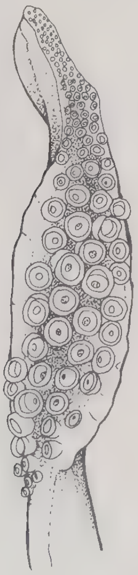
LOLIG Lolig 2

Loligo forbesi Steenstrup, 1856, Danske Vidensk.Selsk.Skrift., (5)4:189.

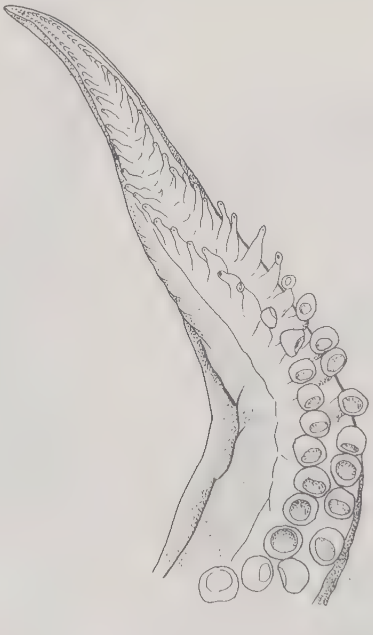
Synonymy : None.

FAO Names :
En - Veined squid
Fr - Encornet veiné
Sp - Calamar veteado

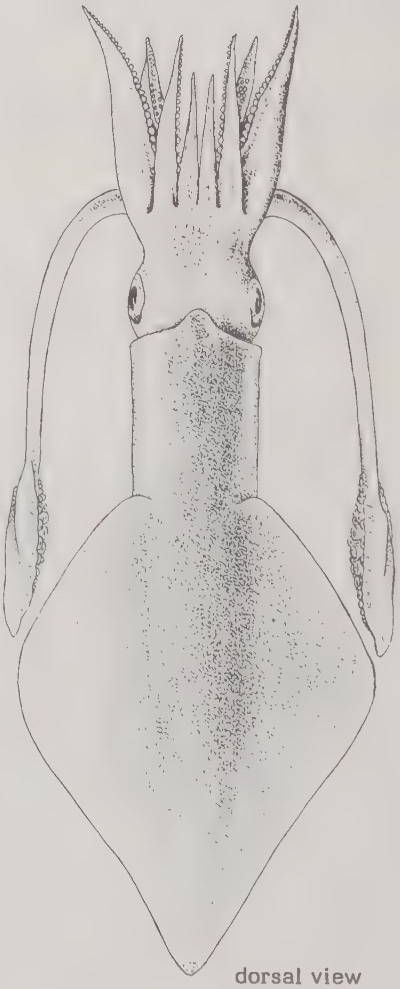
Diagnostic Features : Mantle long, moderately slender, cylindrical; fins rhomboid, their length three quarters that of mantle, their posterior borders slightly concave. Suckers on manus of tentacular club subequal in size; sucker rings with 13 to 18 sharp, conical teeth; left ventral arm (IV) hectocotylized in its distal third by modification of suckers into long papillae which gradually decrease in size distally; largest arm sucker rings with 7 or 8 teeth.



tentacular club

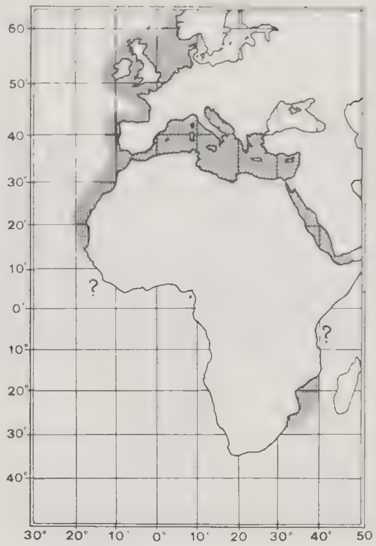


left arm IV of male hectocotylized



dorsal view

Geographical Distribution : Eastern Atlantic: 20^{0}N to 60^{0}N (excluding the Baltic Sea), on the Azores Islands, and along west African coast south to the Canary Islands; its southern boundary is unknown; Mediterranean Sea and Red Sea; East Africa?



Habitat and Biology : A species of subtropical and temperate waters (it avoids temperatures below 8.5^{0}C) occurring over the shelf in the temperate part of its distributional range, but found in deeper waters in subtropical areas; the entire depth range extending from about 100 to 400 m. The population in the northeastern Atlantic is known to carry out seasonal migrations, spending the summer in the North Sea and the eastern part of the English Channel and overwintering in the western part of the Channel. In daytime squids aggregate near the bottom, dispersing at night throughout the water column. Spawning occurs almost throughout the year in the English Channel, showing a peak in winter (December and January, at temperature of 9 to 11^{0}C) and another one in summer. The eggs are attached to hard objects on sandy or muddy bottoms; hatching occurs after 30 to 40 days. Juveniles hatched in January and February attain sizes of approximately 11.5 cm in June; by August, the females measure about 14 cm, the males about 15 cm mantle length, and in November about 25 to 30 cm respectively. Both sexes are then mature (the males since October). Males outnumber females in the adult stage. Postspawning mortality is very high and the life-span does not exceed 1½ years.

L. forbesi feed on small and juvenile fishes, and to a minor extent on other cephalopods, crustaceans, and polychaetes; cannibalism is common. Off the Azores, the most important fish species in their diet is blue jack mackerel (*Trachurus picturatus*). Other fishes preyed upon include bogue (*Boops boops*), and silver scabbardfish (*Lepidopus caudatus*).

Size : Maximum mantle length 90 cm in males and 41 cm in females. Off the Azores, length at first maturity is 56.5 cm in males and 33.5 cm in females (Martins, 1982). In the English Channel, the size of summer-spawning females is 20.2 cm and 28.6 cm in winter spawning females.

Interest to Fisheries : Taken as bycatch in deeper-water trawl-fisheries throughout its range, in winter and fall in northern waters, and in winter off Madeira and the Azores. The English Channel trawl-fishery operates at daytime in depths between 10 and 110 cm. The Azores artisanal fishery captures *L. forbesi* on locally manufactured jigs in periods of great abundance in depths ranging from 200 to 270 m in the central islands, but from 130 to 200 m in the eastern groups. In 1979, an exceptionally good year, 146.5 metric tons of this species were reported from the Azores. This squid is highly appreciated for human consumption and as bait. It is marketed fresh, frozen and canned (small quantities in the Azores).

Local Names : PORTUGAL: Azores: Lula.

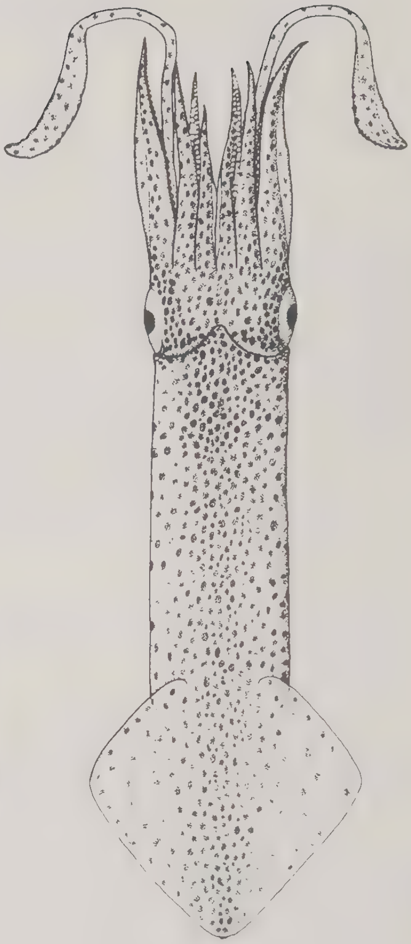
Literature : Holme (1974, biology, English Channel); Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part); Martins (1982, biology, length-weight relationship, Azores).

Loligo gahi Orbigny, 1835

LOLIG Lolig 4

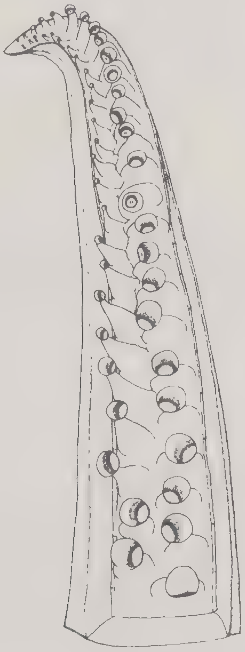
Loligo gahi Orbigny, 1835, *in* 1834-1846, *Voy.Amer.Merid.*, 5(3):60.

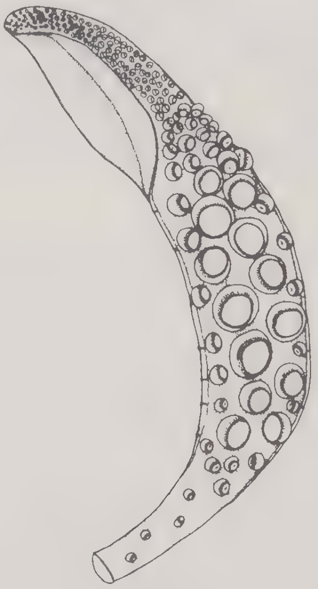
Synonymy : *Loligo patagonica* Smith, 1881.

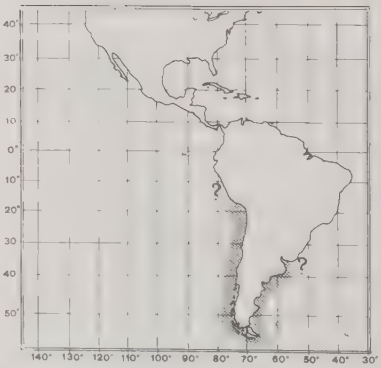

dorsal view

FAO Names : En - Patagonian squid
Fr - Calmar patagon
Sp - Calamar patagónico.

Diagnostic Features : Mantle moderately elongate. Fins rhomboidal, short, their length about 40 to 45% of mantle length. Tentacles long, slender: tentacular clubs narrow, unexpanded, with relatively small suckers on manus, the median ones about 2 times the diameter of the marginal ones; teeth on club sucker rings pointed, very numerous: 25 to 35 (possibly 45). Arms elongate, especially III and IV; arm sucker rings with 6 or 7 broad, flat teeth in distal half, proximal half smooth; left arm IV hectocotylized in distal 1/3: suckers on dorsal row greatly reduced in size and set on elongated, triangular, swollen pedicles that grade smaller distally; ventral row unmodified.


left arm IV of male hectocotylized


tentacular club



Geographical Distribution : Eastern Pacific Ocean from southern Peru to southern Chile; reported in the south Atlantic from the Gulf of San Matias, Argentina to Tierra del Fuego. The northern limits on both coasts are unknown.

Habitat and Biology : A neritic species occurring from the surface to 350 m depth but usually only to 285 m. Its biology is little-known.

Size : Maximum mantle length 28 cm.

Interest to Fisheries : Widely distributed along the Pacific coast of South America where it is caught in trawls incidental to other species. Peru landed 200 tons in 1969. Taken off Argentina as bycatch in trawl fisheries.

The squid fishery on the Patagonian shelf off Argentina started only recently as an exploratory operation, but soon developed into a directed fishery operated mostly by Polish vessels with annual yields of 4 to 5 000 metric tons of 10 to 16 cm squid. A small part of this catch is exported to Spain.

Local Names : ARGENTINA, CHILE, PERU : Calamar.

Remarks : The systematics, biology and fisheries of this species are poorly known. Much information is needed.

Loligo japonica Hoyle, 1885

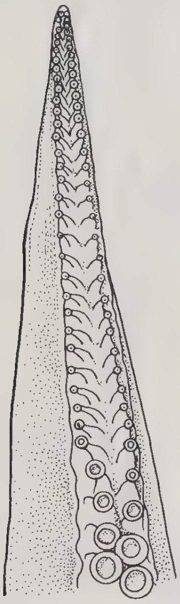
LOLIG Lolig 12

Loligo japonica Hoyle, 1885, Ann.Mag.Nat.Hist., (5)16:187.

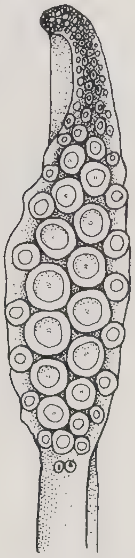
Synonymy : None.

FAO Names :
En - Japanese squid
Fr - Calmar japonais
Sp - Calamar japonés

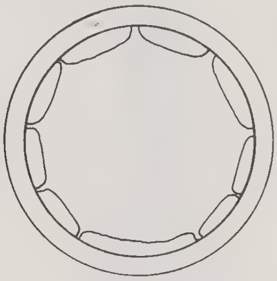
Diagnostic Features : Mantle relatively small, stout. Fins rhomboidal, about 50% of mantle length. Tentacular clubs expanded, lanceolate, the 12 enlarged medial manal suckers 2 or 3 times the diameter of marginal ones, with 20 to 25 closely set, low, rounded teeth. Arms II and III enlarged, thickened, largest sucker rings large with 10 to 13 low, broad, blunt teeth; left arm IV hectocotylized in distal 1/2 to 2/3 by sucker stalks modified into papillae, most with minute, rudimentary suckers on tips; papillae of ventral row especially swollen, somewhat flattened, particularly the proximal 7 or 8; papillae of dorsal row more elongate, separate, conical.



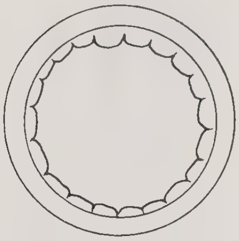
left arm IV of male hectocotylized



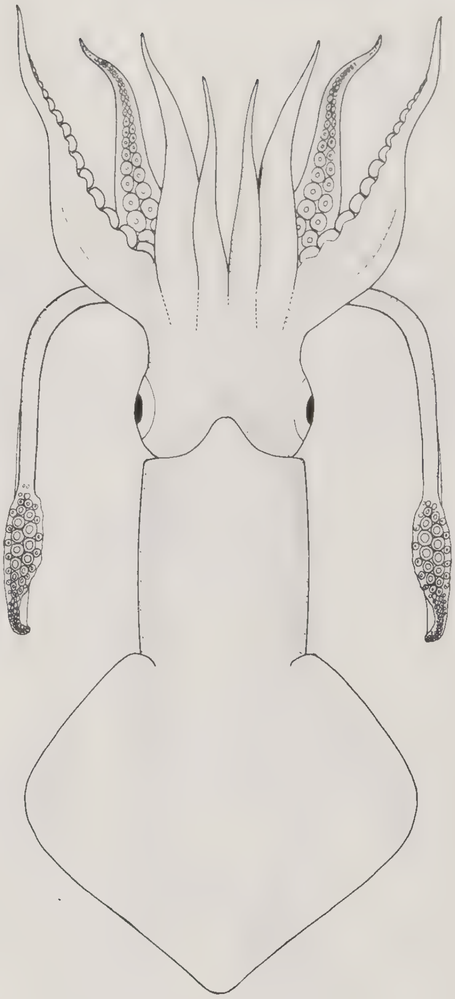
tentacular club



arm III sucker ring

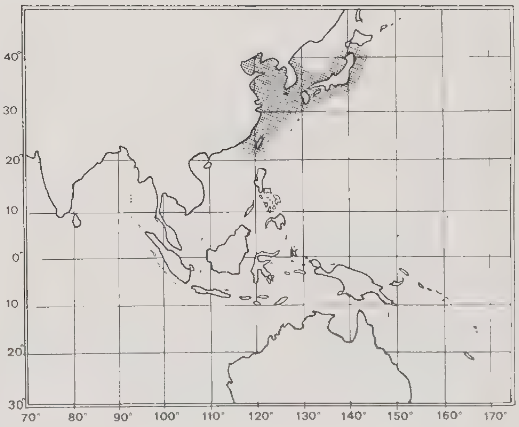


tentacular club sucker ring



dorsal view

Geographical Distribution : Western Pacific: East China Sea and around Japan, excluding northern Hokkaido.



Habitat and Biology : A neritic, semipelagic species most abundant in shallow coastal waters. Spawning takes place during summer and fall in depths between 1 and 10 m. In this period the squid form large aggregations.

Size : Maximum mantle length 12 cm.

Interest to Fisheries : Loligo japonica supports local fisheries during spring and summer north of mid-Honshu, and is one of the 4 loliginid species entering Chinese catches reported to amount to several thousand tons per year (Dong, 1981). It is taken with set nets and small trawls, but it is uncertain whether small individuals can be attracted with light and jigged. The squid is marketed fresh and frozen. The flesh is of excellent quality and often eaten raw.

Local Names : JAPAN: Bouzuika, Hiika, Jhindouika, Koika.

Literature : Tomiyama & Hibiya (1978); Okutani (1980); Dong (1981, cephalopod resources western Pacific).
pelvic fins absent

Loligo kobiensis Hoyle, 1885

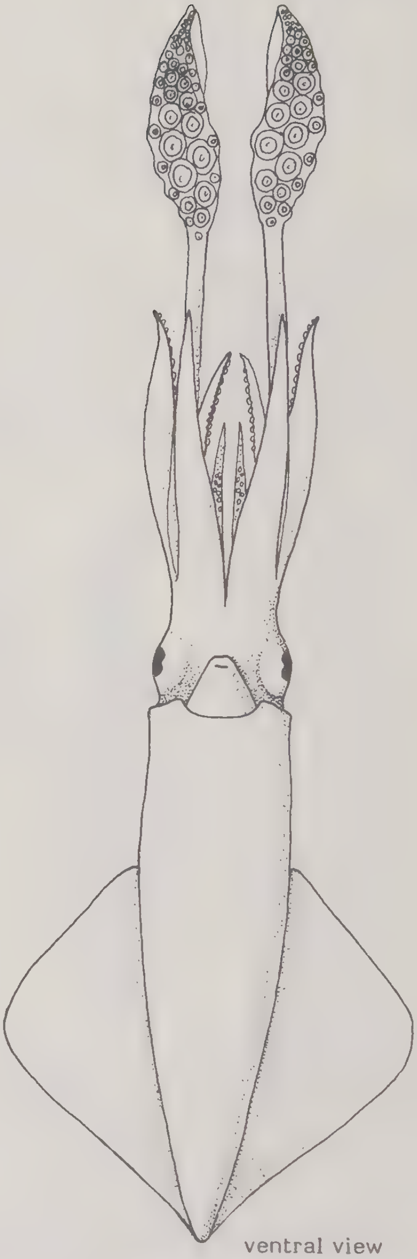
LOLIG Lolig 13

Loligo kobiensis Hoyle, 1885, Ann.Mag.Nat.Hist., (5)16:184.

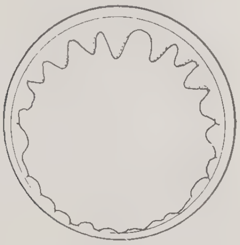
Synonymy : None.

FAO Names :	En - Kobi squid
	Fr - Calmar kobi
	Sp - Calamar kobí

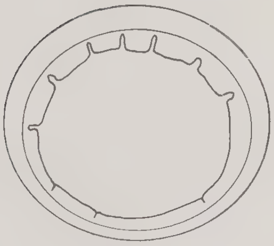
Diagnostic Features : Mantle short, slender. Fins rhomboidal with round lateral angles, their length about 65% of mantle length. Tentacular clubs expanded, lanceolate; protective membranes very broad; club suckers in 4 rows; 6 to 8 medial manal suckers enormously enlarged - 4 or 5 times the diameter of lateral suckers - with entirely smooth rings; other rings with 6 to 15 triangular or quadrangular teeth. Suckers on arms II and III especially enlarged; sucker rings with about 9 (5 to 10) very low, broad, squared, teeth.



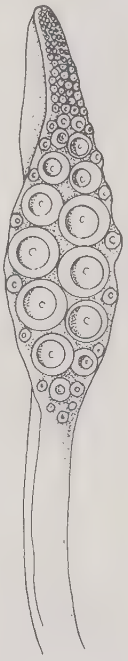
ventral view



tentacular club sucker ring

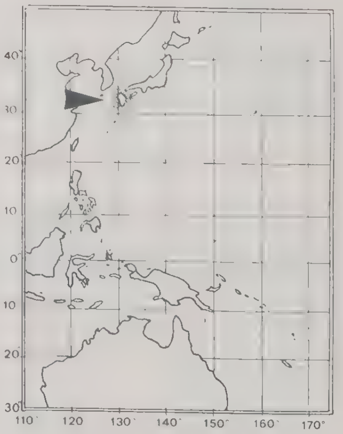


arm III sucker ring



tentacular club

Geographical Distribution : Western Pacific: Southwestern Japan.



Habitat and Biology : A neritic species commonly found in coastal waters, most abundant in the upper 10 m of the water column during spring.

Size : Maximum mantle length 10 cm.

Interest to Fisheries : Taken as bycatch in fisheries for other squids in southwestern Japan.

Local Names : JAPAN: Queen squid.

Literature : Okutani (1977).

Loligo ocula Cohen, 1976

LOLIG Lolig 14

Loligo ocula Cohen, 1976, Malacologia, 15(2):330.

Synonymy : None.

FAO Names : En - Bigeye inshore squid
Fr - Calmar à gros yeux
Sp - Calamar ojigrande

Diagnostic Features : Mantle bluntly pointed posteriorly. Fins subrhomboidal, their lateral angles rounded, length about 45 to 55% of mantle length. Eyes very large, visible part 15 to 21% of mantle length; left arm IV hectocotylized, modified in distal 1/3 to 1/4 but not to tip; 10 to 12 suckers in dorsal row less than 1/2 the diameter of ventral partners; the 2 to 5 suckers proximal to these are enlarged; all modified suckers are set on swollen, triangular bases (stalks).

Geographical Distribution : Western Atlantic: Caribbean Sea around Cuba.

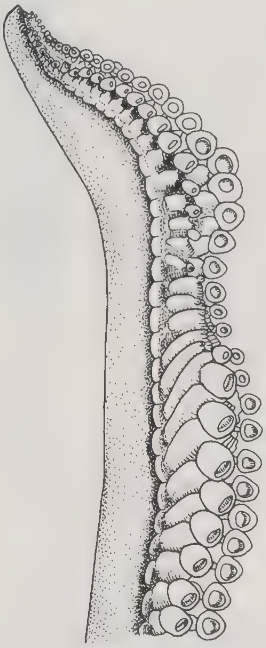
Habitat and Biology : A demersal to semipelagic species taken close to the bottom in depths from 250 to 360 m. Its biology is unknown.

Size : Maximum mantle length 13 cm.

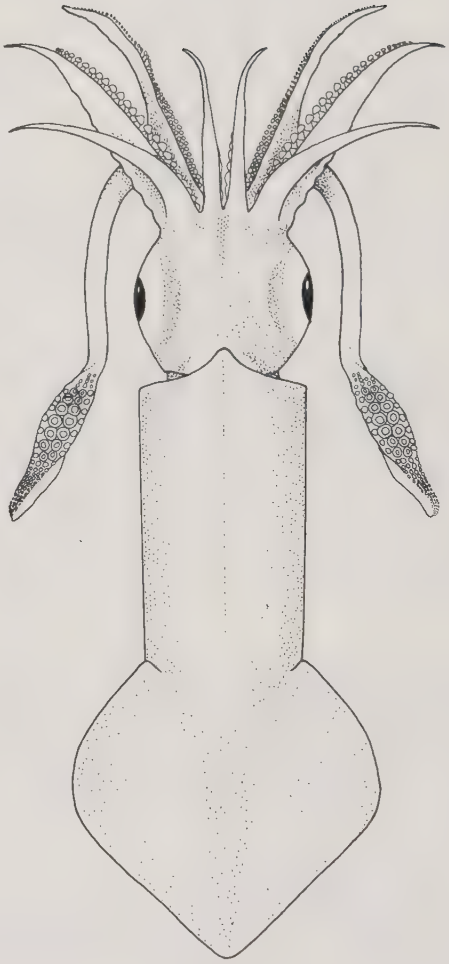
Interest to Fisheries : Fisheries potential undetermined.

Local Names :

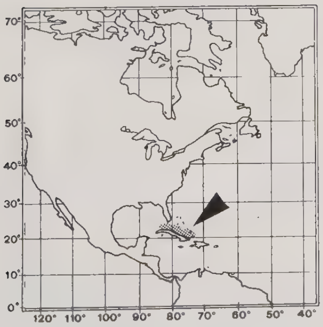
Literature : Cohen (1976).



left arm IV of male hectocotylized



dorsal view



Loligo opalescens Berry, 1911

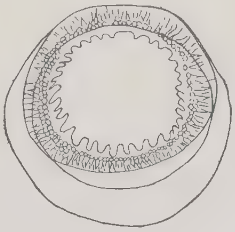
LOLIG Lolig 5

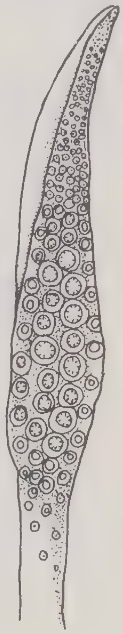
Loligo opalescens Berry, 1911, *Proc.U.S.Nat.Mus.*, 40:591.

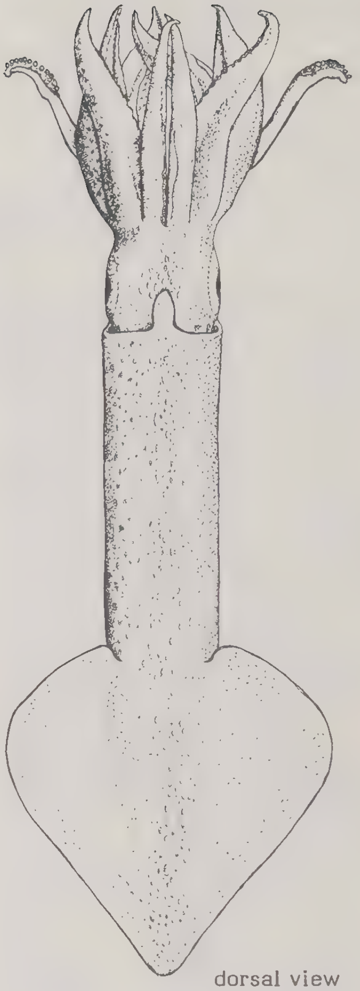
Synonymy : *Loligo stearnsi* Hemphill, 1892.

FAO Names : En - Opalescent inshore squid
Fr - Calmar opale
Sp - Calamar opalescente

Diagnostic Features : Mentle slender, head and arms compact, arms short. Tentacular clubs narrow, unexpanded; sucker rings with about 30 blunt teeth. Arm sucker rings with 9 to 12 blunt teeth. Left arm IV hectocotylized along distal 1/3 by great reduction in sucker size and enlargement of stalks into papillae.


tentacular club sucker ring


tentacular club


dorsal view

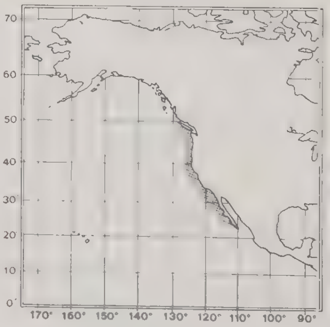
Geographical Distribution : Eastern Pacific: 25°N to 50°N, particularly in the waters of the California Current.

Habitat and Biology : This species schools by sizes and occurs primarily in water temperatures from 10 to 16°C, but is most abundant (and vulnerable to the fishery) after the end of the upwelling season in correlation with the increase in water temperatures when spawning aggregations are formed in 25 to 35 m depths off the Channel Islands and in 20 to 55 m depth in the Monterey Bay; mass spawning in Monterey Bay usually occurs between April and December with peaks in May or June and in November, but takes place progressively later northwards.

The egg masses are deposited on the bottom in big patches of several meters in diameter, usually in relatively shallow water, but in some cases down to 180 m depth; larvae hatch after 21 to 28 days at water temperatures of 16°C and in 30 to 35 days at 13.6°C. Growth is strongly seasonal: squid hatched in early summer will grow rapidly and reach adult size in about 1 year, while late broods subjected initially to low winter temperatures (and hence having low initial grow rates) will take 1 1/2 to 2 years (Spratt, 1978). Post-spawning mortality is high in both sexes.

Market squid of all sizes feed predominantly on euphausids, except on the spawning grounds where they prefer crab larvae (megalopa). Futhermore, their diet includes other crustaceans (such as copepods, mysidacea and cumaceans), molluscs (particularly cephalopods and gastropods) and fish (Karpov & Caillet, 1978). Cannibalism is common. The daily feeding rate is estimated at 14% of the biomass. On the other hand, the species is an important food item in the diet of numerous finfishes (salmon, flatfishes and others), sharks, marine mammals and sea birds.

Size : Maximum size 19 cm dorsal mantle length and 130 g weight in males, 17 cm and 90 g respectively in females; average total length about 30 cm. Minimum size at spawning ranges between 8 and 12 cm in females, and between 7 and 11 cm in males. Males grow larger than females.



Interest to Fisheries : Initially, market squid was fished in only two areas, Channel Island and Monterey Bay, but recently the stocks are exploited all along the Californian coast and northward into Oregon and Washington, particularly in nearshore waters. Annual catches fluctuate around 10 000 metric tons. Most of the catch is taken by US vessels, but small quantities are also landed in Mexico. There is growing interest in the USA in further developing this fishery.

Spawning aggregations of market squid are fished with brails and night lights, pumps and night lights or purse seines from December to April in the Channel Island area, and with lampara nets, between April and September in and around Monterey Bay.

The squids are marketed fresh, frozen or canned for human consumption. The production is aimed primarily at the US and other consumer markets, but the species is used also for bait.

Local Names : JAPAN: Kariforunia yariika; USA: Market squid, Opalescent inshore squid.

Literature : Fields (1950, 1965, biology and life history, fishery); Hurley (1976, food and feeding, growth and respiration; 1977, school structure); Okutani (1977); Recksiek & Frey (eds, 1978, collection of papers on the biology); Tomiyama & Hibiya (1978).

Loligo pealei LeSueur, 1821

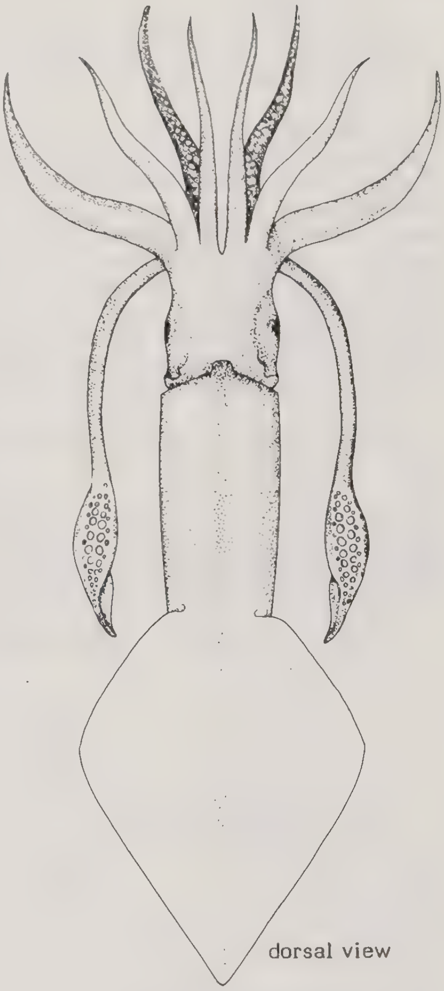
LOLIG Lolig 6

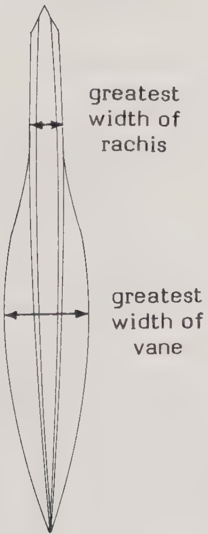
Loligo pealei LeSueur, 1821, J.Acad.Nat.Sci.Phila, 2(1):92.

Synonymy : Loligo pallida Verrill, 1873.

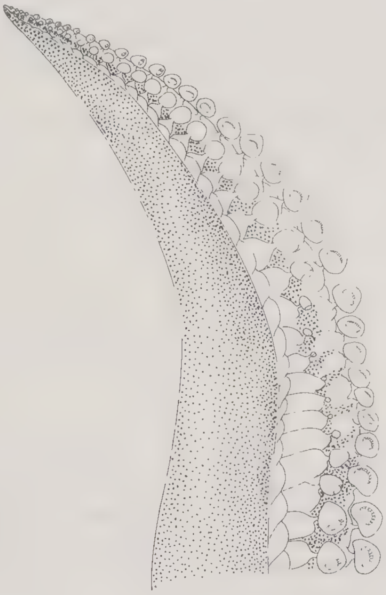
FAO Names : En - Longfin inshore squid (= Common squid SIS Area 31)
Fr - Calmar totam
Sp - Calamar pálido

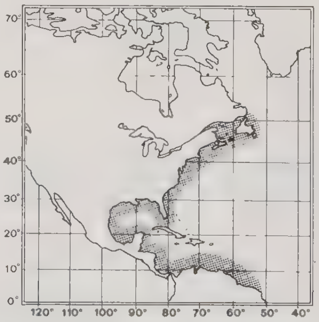
Diagnostic Features : Mantle long, moderately slender, cylindrical, the posterior end bluntly pointed. Eyes not unusually large, diameter of externally visible eyeball 8 to 18% of mantle length, and diameter of dissected lens 2 to 6% of mantle length. Fins rhomboidal, their sides nearly straight. Left ventral arm IV hectocotylized in mature males by modification of the distal third to fourth of arm, but the modification does not extend to arm tip; fewer than 12 of the suckers in dorsal row usually smaller than half the size of their counterparts in the ventral row; bases or pedicels of some of the modified suckers rounded, narrowly triangular. Gladius long, rather wide, feather-shaped, ratio of greatest width of vane of gladius to greatest width of rachis 2.7 to 3.7 in females, 2.4 to 2.9 in males; edge of vane curved (sometimes straight in males), thin, rarely ribbed.


dorsal view



gladius


left arm IV of male hectocotylized



Geographical Distribution : Western Atlantic: 5^{0}N to 50^{0}N, including Gulf of Mexico and Caribbean Sea.

Habitat and Biology : A neritic species occurring over the continental shelf and upper slope from the surface down to about 400 m depth, but rare or absent around islands. Optimum water temperatures for this species fluctuate between 10 and 14^{0}C. Adults are demersal in daytime but disperse into the water column and many appear at the surface (in summer or in warm waters) at night. Longfin squid are known to effect seasonal migrations. They overwinter in dense concentrations in offshore areas at depths between 100 and 200 m, and move thereafter to the nearshore feeding and spawning areas where they are found from late spring through fall. Mature squids are encountered almost throughout the year, but two peak spawning periods generally are observed: the first and more important in spring, and the second, less intense, in late summer and fall, this leading to the differentiation of multiple cohorts each year. Eggs are laid in gelatinous, finger-like strands, many of which are attached together in large masses ("sea mops") to solid substrates (i.e. rocks, shells, shipwrecks) in depths between 10 and 250 m. The eggs hatch after approximately 27 days (at temperatures at 12 to 18°C) or after 11 days (at 21.5 to 23°C) (McMahon & Summers (1971). Planktonic larvae and juveniles are abundant in surface waters and resemble adults in appearance (no metamorphosis). Squid originating from the spring spawn reach maturity in summer of the following year (after about 14 months, while individuals hatched in early autumn will spawn only in spring of the second successive year, at about 20 months of age. This overcrossing of the life-cycles of two life successive groups of hatchlings is a phenomenon also observed in other squid and cuttlefish species. Postspawning mortality is very high, particularly in females, a fact that is reflected in the smaller maximum size of females.

Longfin squid prey on euphausids, fishes and other squids. Cannibalism is common. The species is in turn preyed upon by yellowfin tuna (Thunnus albacares), toothed whales and other pelagic predators.

Size : Maximum mantle length 50 cm in males, approximately 40 cm in females off the southern New England States of the USA; common length in catches ranges between 10 and 20 cm. Maturity is attained at about 15 cm in males and 13 or 14 cm in females.

Interest to Fisheries : Longfin squid was formerly taken only as bycatch to the shrimp and scale-fish trawl fishery, but in recent years an international fishery was developed, specifically for this species. The world catch of longfin squid fluctuated irregularly between about 10 700 metric tons in 1978 and 23 600 metric tons in 1980. In 1981 catches were back on the 1978 level. This can be explained by the absence of Spanish and Mexican vessels from Fishing Area 21 (northwestern Atlantic) where almost the entire catch is taken. The major exploiting countries are Japan, Italy and USA (FAO, 1983). Fishing operations are most intensive from November to March along the outer continental shelf of the New England and mid-Atlantic states where the overwintering stock is exploited. The identified longfin squid catch from the Gulf of Mexico and the Caribbean in 1981 was reported as only 40 metric tons but it is suspected that this species accounts for part of the catch identified as Loligo spp. which amounted to almost 1 600 metric tons in the same year (FAO, 1983). The flesh of longfin squid is of excellent quality and marketed fresh and frozen.

Local Names : JAPAN: Amerika kensakiika; USA: Bone squid, Common squid, Long-finned squid, Winter squid.

Literature : Summers (1968, 1971, growth and size distribution); McMahon & Summers (1971, temperature effect on development rate); Serchuk & Rathjen (1974, abundance in relation to temperature); Cohen (1976, systematics); Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31); Tibbets (1977, fishery); Tomiyama & Hibiya (1978); Rathjen, Hixon & Hanlon (1979, fishery).

Remarks : Medical research, primarily in neurophysiology is conducted on the giant nerve fibres.

Loligo (Doryteuthis) plei Blainville, 1823

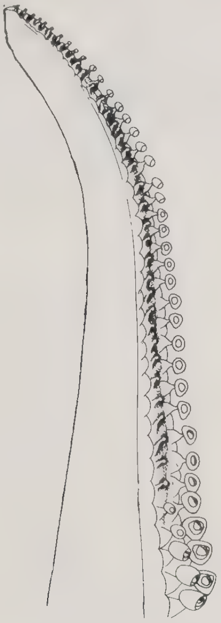
LOLIG Lolig 3

Loligo plei Blainville, 1823, J.Phys.Chim.Hist.Nat., 96:132.

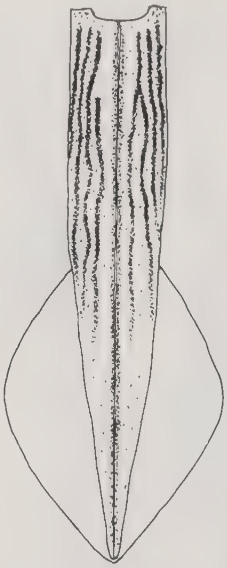
Synonymy : Loligo brasiliensis Blainville, 1823; Doryteuthis plei (Blainville, 1823).

FAO Names :
En - Slender inshore squid
Fr - Calmar flèche
Sp - Calamar flecha

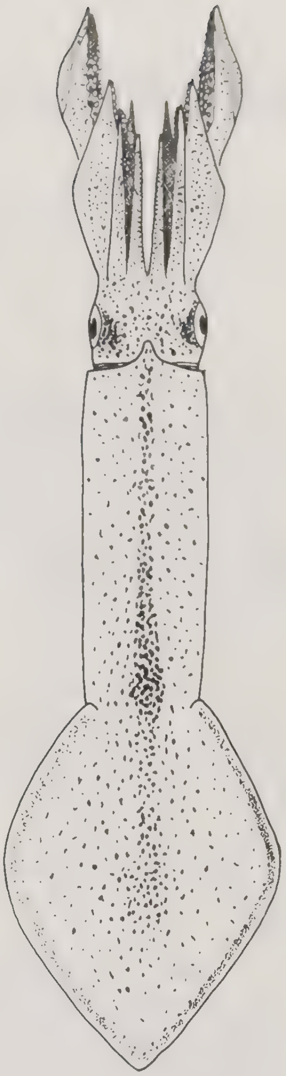
Diagnostic Features : Mantle long, slender, cylindrical, the posterior end acutely pointed. Fins rhomboid, their sides fairly straight. Eye not unusually large, diameter of externally visible eyeball 14 to 19% of mantle length, diameter of dissected lens 2 to 7% of mantle length. Tentacular clubs with marginal suckers on manus of tentacular club relatively small. Left ventral arm IV hectocotylized in mature males by a modification of distal 1/2 to fourth of arm that extends to arm tip; one half to 3/4 (42 to 82) of the suckers in dorsal row much smaller than half the size of their ventral counterparts; modified (small) suckers on small, narrow triangular pedicels. Gladius long, slender, feather-shaped; ratio of greatest width of vane of gladius to greatest width of rachis 1.5 to 2.4; edge of vane straight (often curved in females), thick and ribbed or rod-like (mature males especially).



left arm IV of male hectocotylized

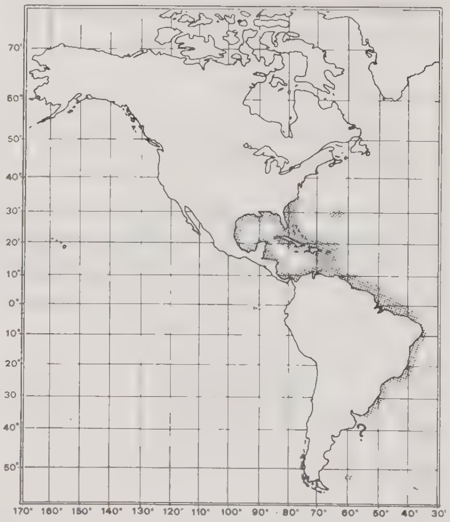


ventral view of male showing midline ridge and colour pattern



dorsal view

Geographical Distribution : Western Atlantic: Southern Brazil, northern Argentina (southern limit unconfirmed) to 35°N, including Caribbean Sea, Gulf of Mexico and Bermuda.



Habitat and Biology : A neritic, semipelagic species most abundant over the shelf but with a lower depth range of 370 m. The squids concentrate near the bottom during the day but disperse into the water column at night.

Some spawning may occur almost throughout the year with two peaks: March and September through October in the Caribbean Sea, between June and August and from December to March off Brazil. Mass spawning takes place in shallow waters. There is some exchange between the spring and autumn spawning groups even though squids of different size may be morphometrically diverse. Males grow larger than females.

Size : Maximum mantle length 35 cm males, 22 cm in females.

Interest to Fisheries : Taken as bycatch to shrimp trawling and other directed fisheries throughout its range. Small trawl or light and dip-net fisheries for this species exist in Progreso, Yucatan. Also taken as bycatch (identified as Loligo brasiliensis) in shrimp fisheries between Buenos Aires and Mar del Plata (Argentina). The main fishing period extends from February through August, the catches drop sharply thereafter. Best catches are obtained between 20 and about 75 m depth. Gears used include the "raùo" or beam trawl and the "red de portones" or otter trawl. Arrow squid is used for food and bait.

Local Names : USA: Arrow squid, Slender inshore squid.

Literature : Okutani (1977, 1980); Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31); Rathjen, Hixon & Hanlon (1979, fishery resources).

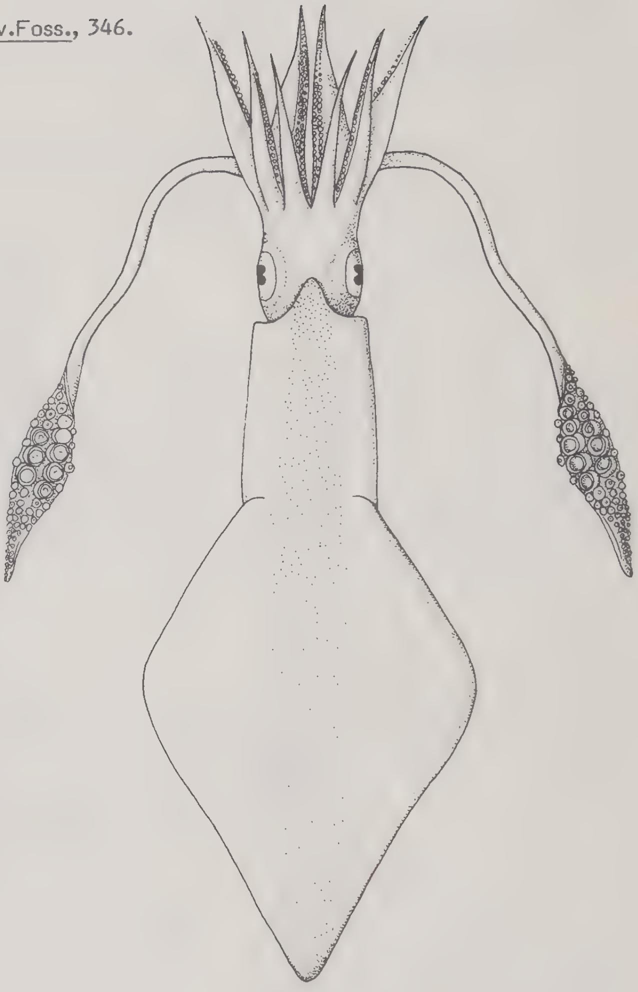
Loligo reynaudi Orbigny, 1845

LOLIG Lolig 15

Loligo reynaudi Orbigny, 1845, in 1845-1847, Moll.Viv.Foss., 346.

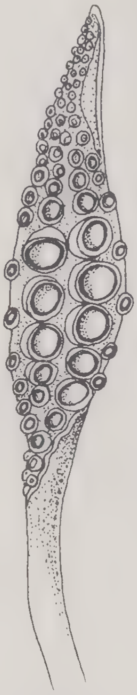
Synonymy : None.

FAO Names : En - Cape Hope squid
Fr - Calmar du Cap
Sp - Calamar del Cabo



dorsal view

Diagnostic Features : Mantle narrow, elongate. Fins long, 65% of more of mantle length. Tentacles long; clubs expanded; club suckers on the manus (medial rows) greatly enlarged. Arms short (in comparison with L. vulgaris).



tentacular club

Geographical Distribution : Eastern central Atlantic: From South Africa at least to Angola, but actual limits of geographical range unknown.

Habitat and Biology : A neritic, semipelagic species occurring over the continental shelf; the upper and lower limits of the depth range are undetermined.

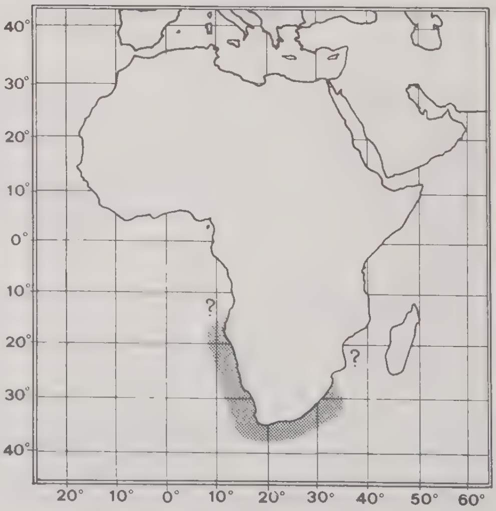
Size : Maximum mantle length 40 cm, weight more than 1 kg.

Interest to Fisheries : Japanese and South African multispecies trawl fisheries are each catching around 3 000 tons of this squid per year, between Cape Town and Durban on the Agulhas Bank at depths of less than 200 m. Currently marketed in France and Italy.

Local Names :

Literature : Cooper (1979, length-weight relationship).

Remarks : May be synonymous with L. vulgaris or a subspecies of L. vulgaris. This is a very poorly known species and specimens are needed to verify its systematic position.



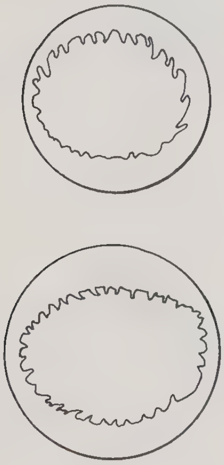
Loligo roperi Cohen, 1976

Loligo roperi Cohen, 1976, Malacologia, 15(2):347.

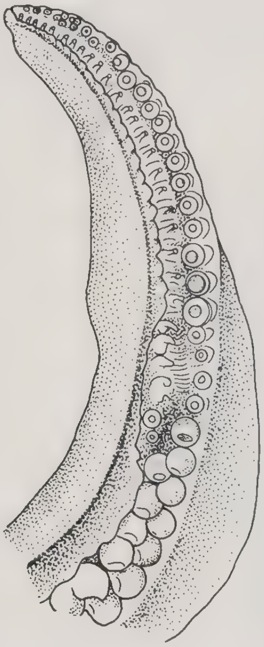
Synonymy : None.

FAO Names : En - Island inshore squid
Fr - Calmar créole
Sp - Calamar insular

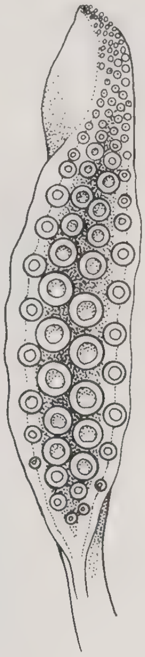
Diagnostic Features : Mantle long, slender (a small species). Fins ovoid, short, 33 to 39% of mantle length. Tentacles short, 14 to 21% of mantle length; clubs with fewer than 25 transverse rows of suckers (19 to 24). Left arm IV hectocotylized for more than 50% of arm length (57 to 62%) to tip; 80% of suckers of dorsal row modified into minute suckers set on broadly triangular pedicels; 3 to 5 suckers of ventral row at origin of hectocotylus very reduced in size, remaining suckers normal.



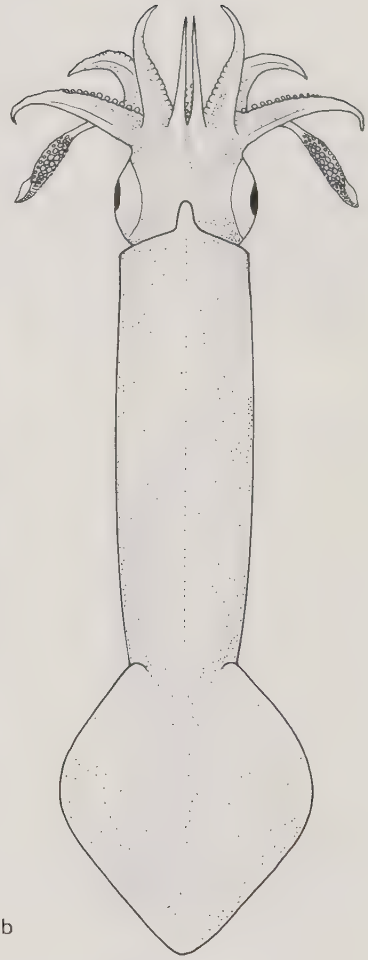
tentacular club
sucker rings



left arm IV
hectocotylized



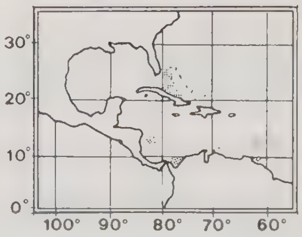
tentacular club



dorsal view

Geographical Distribution : Western Atlantic Ocean: Caribbean Sea.

Habitat and Biology : A neritic species ranging in depth from 48 to 304 m (taken at surface at night with night-light attraction). Apparently associated with islands.



Size : Maximum mantle length 7.2 cm; maturity is attained at 4.3 cm.

Interest to Fisheries : Fisheries potential undetermined.

Local Names :

Literature : Cohen (1976, detailed description, distribution).

Loligo sanpaulensis Brakoniecki, 1984

LOLIG Lolig 17

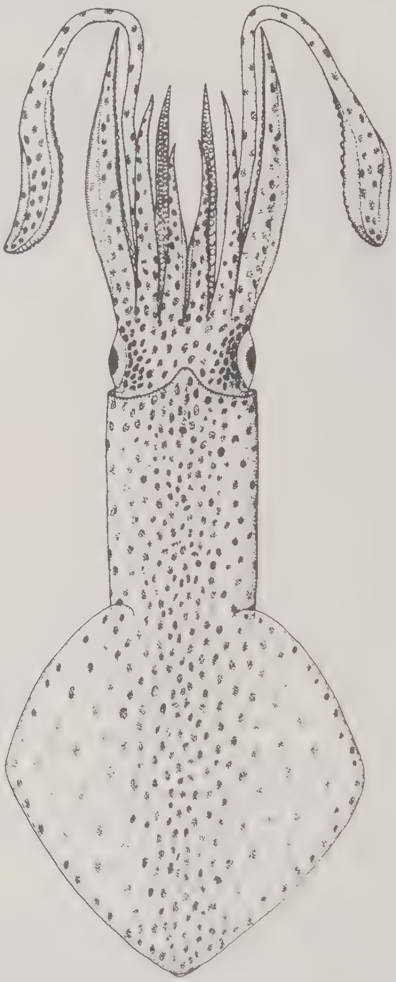
Loligo sanpaulensis Brakoniecki, 1984, Bull.Mar.Sci., 34(2).

Synonymy : Loligo brasiliensis Blainville, 1823 (in part: by Castellanos, 1967; 1967a, Castellanos & Menni, 1968; Castellanos & Cazzaniga, 1979). Doryteuthis plei Blainville, 1823 (in part: by Palacio, 1977); Loligo brasiliensis Blainville, 1823 = nomen dubium fide Brakoniecki, in press.

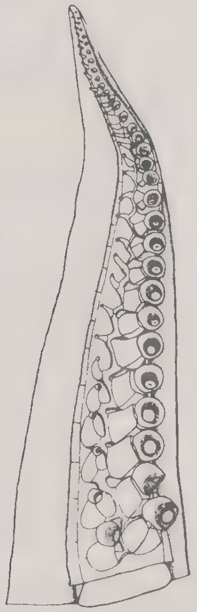
FAO Names :

En	Sao Paulo squid
Fr	Calmar de Sao Paulo
Sp	Calamar de Sao Paulo

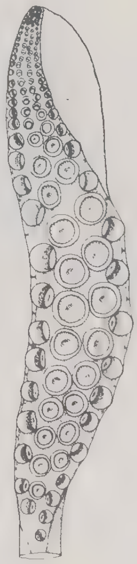
Diagnostic Features : Mantle moderately long. Fins rhombic, relatively long, 55 to 60 exceptionally to 65% of mantle length. Tentacles long; clubs expanded, marginal suckers relatively large median manal suckers only about 1/3 larger than marginal ones; rings with about 25 pointed, separated teeth, smaller and more widely spaced proximally. Arms moderately long, sucker rings with 5 to 7 broad truncate teeth distally, smooth proximally; left arm IV hectocotylized in distal 1/2 (45% of arm length) by great reduction in size of suckers in dorsal row that are set on conical to elongate thickened pedicels; suckers on ventral row normal but pedicels are slightly elongate and thickened.



dorsal view

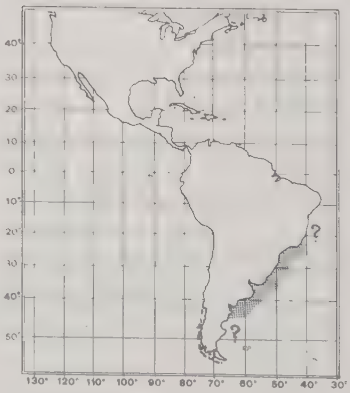


left arm IV
hectocotylized



tentacular
club

Geographical Distribution : Southwestern Atlantic: from central Argentina to central Brazil but limits unknown, especially the northern (records to date from 20° to 42°S latitude).



Habitat and Biology : A neritic species in coastal waters ranging in depth from 0 to 60 m (probably somewhat deeper). Occurs in central Argentina in summer,therefore probably does not extend southward into cold waters.

Size : Maximum mantle length 16 cm.

Interest to Fisheries : Taken as bycatch in trawl fisheries; some directed fisheries are now developing in Uruguay, Argentina and Brazil.

Local Names : ARGENTINA, BRAZIL, URUGUAY: Calamar.

Remarks : This species has been called Loligo brasiliensis by some authors and Doryteuthis plei by others, but the name Loligo brasiliensis cannot be clearly tied to any known species. The confused names and taxonomy have made designations of species utilized in the fishery equally confusing. The species is being redescribed under a new name by Brakoniecki (Bull.Mar.Sci., 1984). The use of the other names should thereafter be avoided.

Loligo (*Doryteuthis*) *sibogae* (Adam, 1954)

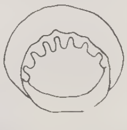
LOLIG Lolig 18

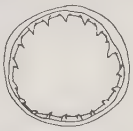
Doryteuthis sibogae Adam, 1954, *Results Exped.India Neerl.Orient.*, 55c:146.

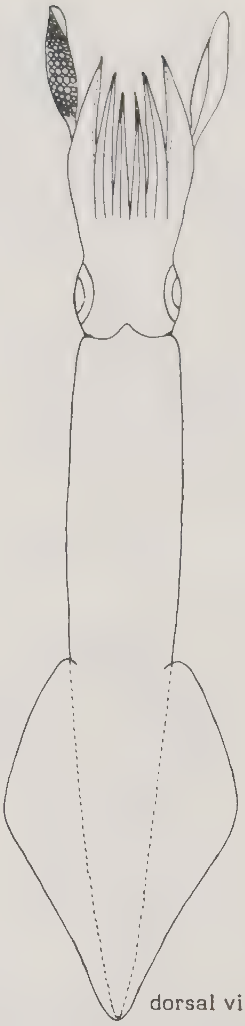
Synonymy : *Doryteuthis sibogae* Adam, 1954.

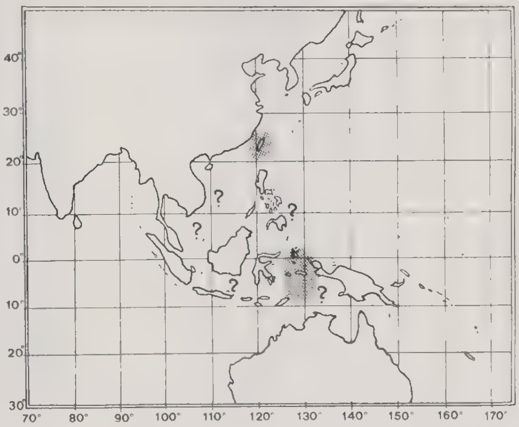
FAO Names :
En - Siboga squid
Fr - Calmar siboga
Sp - Calamar siboga

Diagnostic Features : Mantle very long and slender; width 1/5 to 1/7 of length. Fins narrow, relatively short, their length about 45% of mantle length. Tentacles short, slender, clubs short; medial suckers on manus slightly enlarged, the largest ones with 15 to 20 conical, sharp, incurved, widely spaced teeth around entire ring; the largest suckers from the club and arm III are about equal in size. Arms relatively very short; arm sucker rings smooth proximally but with 7 to 9 plate-like, truncate (squared) teeth distally, the central 1 or 2 narrowest; left arm IV hectocotylized for 30 to 45% of its length by the distal suckers and stalks being modified into cone-shaped fleshy papillae, those on the ventral row the longest; the 15 to 20 pairs of suckers proximally remain modified throughout growth. A paired, bean-shaped light organ present around the ink sac.


largest arm III sucker ring


largest tentacular club sucker ring


dorsal view



Geographical Distribution : Western Pacific: Eastern Indonesia and China (Pescadores Islands).

Habitat and Biology : A semipelagic, neritic species; its depth range is undetermined; sexually mature squids occur during August off Pescadores Islands. The biology of this species is very poorly known.

Size : Maximum mantle length 16 cm.

Interest to Fisheries : Taken as bycatch in the fisheries for larger squids in Taiwan (Province of China).

Local Names :

Literature : Okutani (1980).

Remarks : The generic status of this species needs to be clarified, as it is referred to both *Loligo* and *Doryteuthis* by different authors.

Loligo (*Doryteuthis*) *singhalensis* Ortmann, 1891

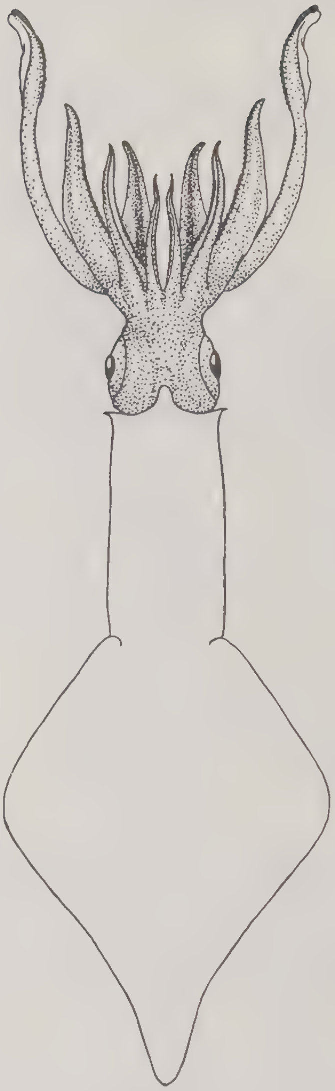
LOLIG Lolig 19

Loligo singhalensis Ortmann, 1891, *Zool.Jahr.Abt.Syst.*, 5:676.

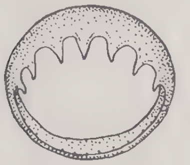
Synonymy : None.

FAO Names : En - Long barrel squid
Fr - Calmar baril
Sp - Calamar buril

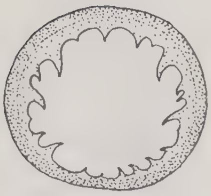
Diagnostic Features : Mantle very long and slender, attains a large size for loliginids. Fins very long, up to 70% of mantle length; a ridge along ventral midline of mantle of males. Tentacular clubs short, slightly expanded; suckers in medial rows of manus only about 25% larger than those on lateral rows with 20 to 22 sharply pointed, curved teeth, some of which are quite reduced in size. Arms relatively short; sucker rings with 7 to 9 long, slender bluntly pointed to truncate teeth distally, smooth proximally. Left arm IV hectocotylized in distal half with slender papillae, each bearing a minute sucker. A paired, bean-shaped light organ present around ink sac.



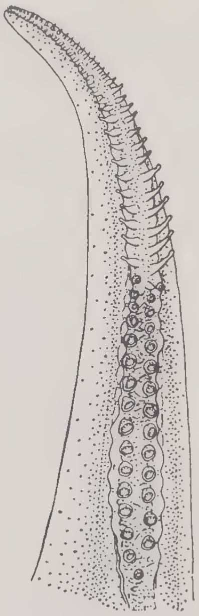
dorsal view



arm III
sucker ring



tentacular club
sucker ring



left arm IV of male
hectocotylized

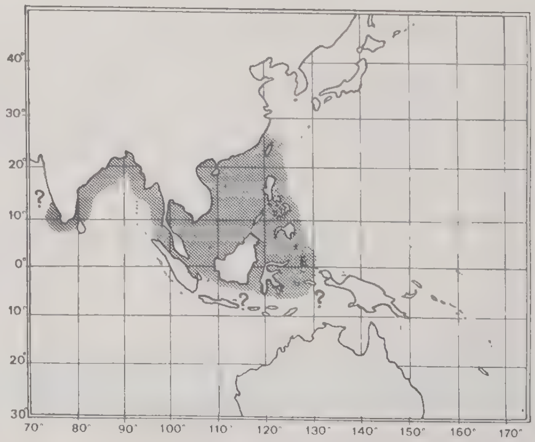
Geographical Distribution : Indo-Pacific: Eastern Arabian Sea, Bay of Bengal to South China Sea and Philippines Sea.

Habitat and Biology : A neritic, semipelagic species occurring at depths from 30 to 120 m. It is positively phototactic, a feature that is utilized in the fishery by attracting it by light prior to capture. It aggregates in large schools in summer, probably for mating and spawning. Males grow larger than females.

Size : Maximum mantle length 50 cm in males, 31 cm in females; weight about 1 kg in males, 800 g in females.

Interest to Fisheries : The third most important squid trawled in Hong Kong waters after Loligo edulis and L. chinensis. In the Philippines it supports localized and subsistence fisheries and is taken by purse seines and dip-nets after attraction with torches and lamps.

Local Names : CHINA: Cheung woo chak, Cheung yau tung.



Literature : Okutani (1977, 1980).

Remarks : The generic status of this species needs to be clarified.

Loligo surinamensis Voss, 1974

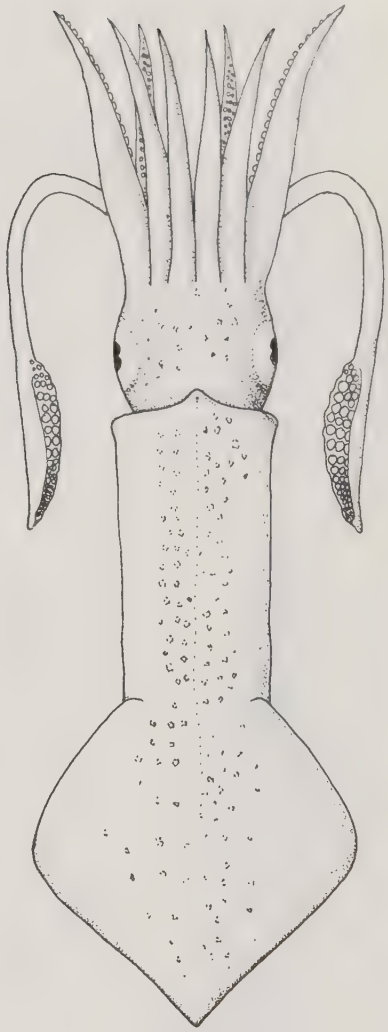
LOLIG Lolig 20

Loligo surinamensis Voss, 1974, Zool.Meded., 48(6):43.

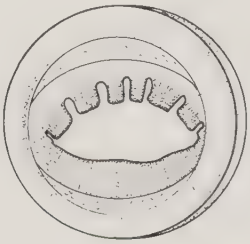
Synonymy : None.

FAO Names :
En - Surinam squid
Fr - Calmar du Surinam
Sp - Calamar surinamés

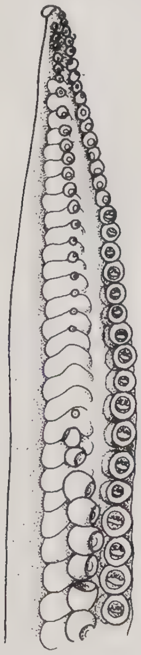
Diagnostic Features : Mantle moderately broad, about 25% of mantle length. Fins about 50% of mantle length, rhomboidal. Tentacular clubs expanded, with 38 to 40 transverse rows of suckers; manal suckers enlarged; medial ones 1/3 larger than marginal ones; largest manal sucker rings with about 48 alternating large and small, sharply pointed, curved teeth. Arms relatively long, about 45% of mantle length; arm sucker rings with 5 to 8 truncated teeth in distal half, central ones narrowest, proximal 1/2 smooth; left arm IV of male hectocotylized in distal portion beginning at the 22nd to 24th pair of suckers: sucker bases (stalks) in dorsal row enlarged and flattened transversly, suckers descreased in size; ventral row with a few reduced suckers opposite modified part in dorsal row; tip unmodified.



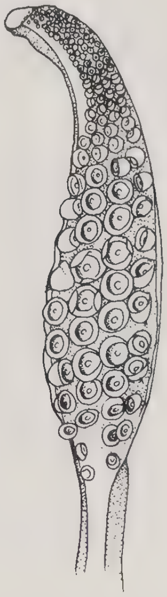
dorsal view



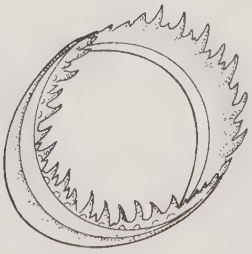
arm III
sucker ring



left arm IV of male
hectocotylized

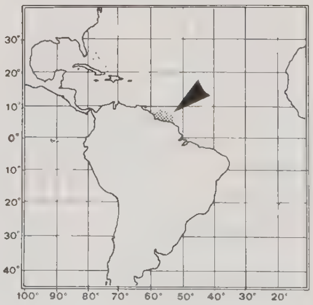


tentacular
club



tentacular club
sucker ring

Geographical Distribution : Southern Caribbean Sea: currently only known from around the mouth of the Suriname River, Surinam.



Habitat and Biology : A neritic species, known depth range: 27 to 37 m.

Size : Maximum mantle length 12 cm.

Interest to Fisheries : At present undetermined.

Local Names :

Literature : Okutani (1977).

Loligo uyii Wakiya & Ishikawa, 1921

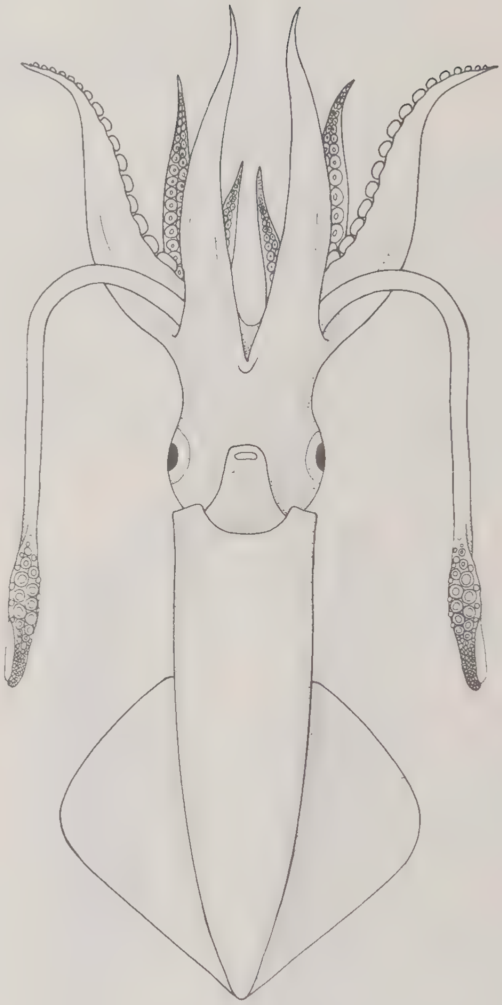
LOLIG Lolig 21

Loligo uyii Wakiya & Ishikawa, 1921, Zool.Mag.Tokyo, 33:286.

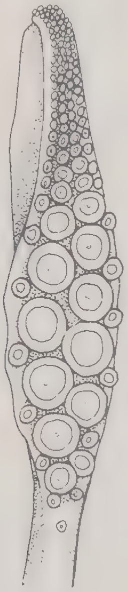
Synonymy : Loligo tagoi - Sasaki, 1929; Loligo gotoi Sasaki, 1929.

FAO Names :
En - Little squid
Fr - Calmar mignon
Sp - Calamar balilla

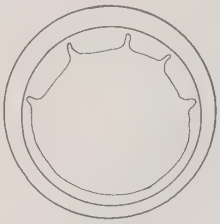
Diagnostic Features : Mantle short, moderately stout, its width about 25% of the mantle length. Fins rhomboidal, their angles rounded, length about 60% of mantle length. Tentacular clubs slightly expanded, lanceolate, about 8 suckers in 2 median manal rows greatly enlarged with smooth rings; medial and distal rings with very low broad plate-like or semilunar teeth (7 to 10). Arm sucker rings with 3 to 6 (mostly 4 or 5) very broad, short, rounded-rectangular to semilunar teeth in distal half, proximal half smooth; left arm IV hectocotylized along distal 2/3 with about 75 suckerless papillae, those on dorsal row small, rounded, separate, but the ones on ventral row greatly swollen and connected into a ridge.



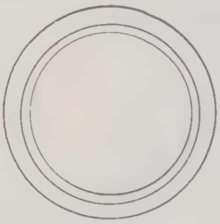
ventral view



tentacular club

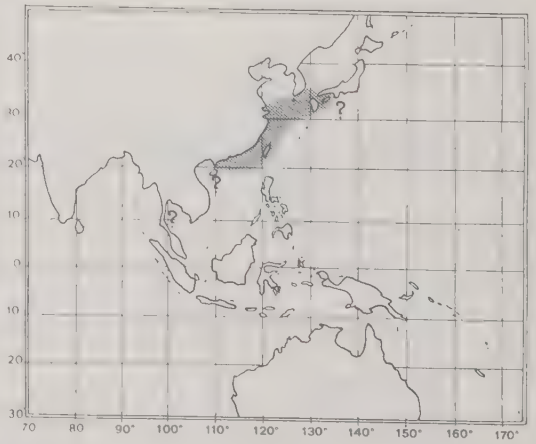


arm III sucker ring



tentacular club sucker ring

Geographical Distribution : Indo-West Pacific Ocean: Southern Japan, Yellow Sea to Hong Kong.



Habitat and Biology : A neritic, coastal species occurring to about 50 m depth.

Size : Maximum mantle length 10 cm.

Interest to Fisheries : This species was reported to contribute less than 1% to the 1979 catch of squids taken by commercial otter-board trawlers and pair trawlers in the Gulf of Thailand (species identification is unconfirmed). It is also reported among the 5 major species fished in Malaysian waters (Latif, 1982).

Local Names : CHINA: Yau jai.

Literature : Okutani (1980).

Remarks : Distribution of this species in Gulf of Thailand needs to be confirmed with positive identification of specimens.

Loligo vulgaris Lamarck, 1798

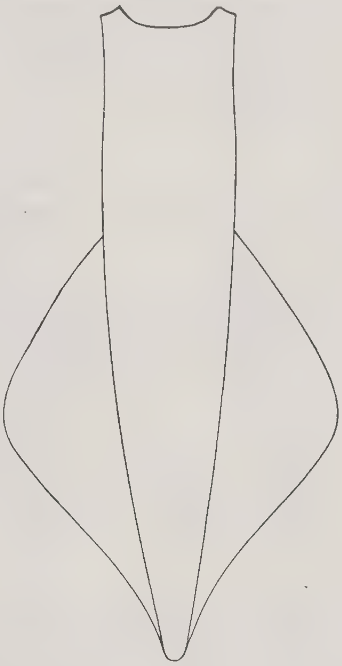
LOLIG Lolig 1

Loligo vulgaris Lamarck, 1798, Bull.Soc.Philom.Paris, 2:130.

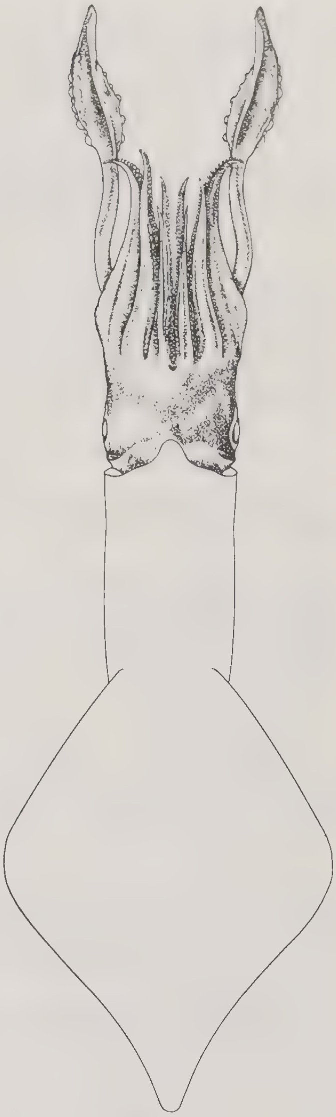
Synonymy : None.

FAO Names :
En - European squid
Fr - Encornet
Sp - Calamar

Diagnostic Features : Mantle long, moderately slender, cylindrical. Fins rhomboid, their length two thirds of mantle length, their posterior border slightly concave. Manus of tentacular clubs with 4 longitudinal rows of suckers, the 2 median rows with 6 enlarged suckers each; sucker rings of median rows on manus with approximately 30 irregularly-sized teeth; dactylus with about 20 transverse rows of minute suckers. Left ventral arm IV hectocotylized along its distal third to fourth by modification of suckers into papillae that decrease in size distally; arm sucker rings with 20 teeth, distal ones large and pointed, proximal ones minute or absent.



ventral view



dorsal view

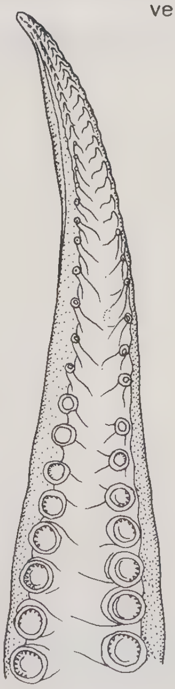
Geographical Distribution : Eastern Atlantic: From approximately 20°S to 55°N; around the British Isles, North Sea; Mediterranean Sea.

Habitat and Biology : A neritic, semi-pelagic species; ranging in depth from the surface to approximately 500 m, and most abundant between 20 and 250 m, deepest in winter.

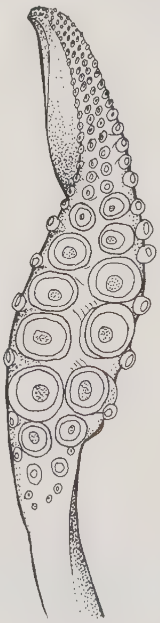
European squid is known to migrate vertically and horizontally in response to changes in environmental conditions. The stock in the northeastern Atlantic overwinters in deeper waters off Portugal, approaches the French coast in spring, and migrates from May through June further north into the North Sea where spawning takes place in depths from 20 to 80 m. A southward migration takes place in fall.

The stock on the west Saharan fishing grounds, likewise overwinters in deeper offshore waters and migrates onshore for spawning in spring and fall. Accordingly, juveniles appear to recruit into the fishery in February and March and between July and September.

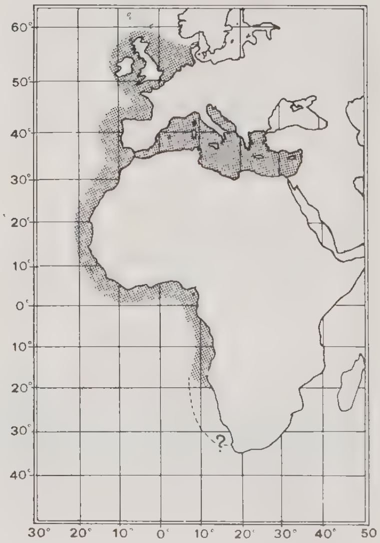
In the western Mediterranean, European squid migrate into deeper water in late fall; the largest individuals begin their onshore migration as early as in January and February, followed in summer by the smaller ones. Gradual spawning extends for most part of the year with peaks in early summer and early fall.



left arm IV hectocotylized



tentacular club



Females produce up to 20 000 small eggs (diameter about 2 mm) which are deposited in gelatinous tubes containing tens of eggs and attached to debris and other hard objects on sandy to muddy bottoms. The larvae hatch after an incubation period fluctuating between 25 days (at 22°C) and 45 days (at 12 to 14°C).

The number (up to 800) and size of spermatophores is directly related to the size of the male. Males reproducing for the second time usually carry more than those reproducing for the first time.

Growth is faster in summer than in winter in both sexes; the rate is greater in males as compared with females.

In the Atlantic, June hatchlings attain approximately 12 cm mantle length in December and 13 or 14 cm in the following April. By August, males reach about 17.5 cm and in April of their second year 21 cm, compared to 17 cm in females.

In the western Mediterranean, juvenile females and males migrating onshore in July measure about 7 and 8 cm respectively (ranges 6.6 to 8 cm, and 7 to 8.3 cm) and grow to about 15 and 16 cm in December (ranges 14 to 16 cm and 15 to 17 cm). On the other hand, juveniles approaching the coast in October are approximately 5.7 cm long (range 5 to 6.3 cm) growing to 8.3 cm (range 7.8 to 8.9 cm) towards the end of December when they leave the shallow waters. By March they have attained a length of 13 cm. After May they mix with the other group in a new onshore migration where spawning occurs. Longevity is 2 years in females and about 3 years in males.

European squid feeds on fishes and crustaceans. Cannibalism is common.

Size : Maximum mantle length 42 cm in males, 32 cm in females; maximum weight 1.5 kg. Length at first maturity is about 13 cm in males and 16 cm in females.

Interest to Fisheries : The major fishing grounds for European squid are located off Portugal, on the west African Banks and in the western Mediterranean, where the species is taken in the international fisheries with otter trawls and purse seines in daytime. It is occasionally caught at night with light attraction. Throughout its range, this squid is also the object of local artisanal fishery deploying a variety of gears, particularly jigs.

The species is marketed fresh and frozen. Separate statistics are not reported.

Local Names : ALGERIA: Kalmar; BULGARIA: Kalmar; CYPRUS: Kalamari; EGYPT: Sobbeit; FRANCE: Encornet; GREECE: Kalamari; ITALY: Calamaro; LIBYA: Habbar; MALTA: Klamar; MONACO: Totanu; MOROCCO: Calamar; SPAIN: Calamar; TUNISIA: Mettik; TURKEY: Kalmar; USSR: Kalmar; YUGOSLAVIA: Lignja.

Literature : Mangold-Wirz (1963, biology); Fischer (ed., 1973, Species Identification Sheets, Mediterranean and Black Sea, fishing area 37); Cort Basilio & Pérez-Gandaras Pedrosa (1973, fisheries on West Sahara Banks); Roper (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part); Fisheries Committee for the Eastern Central Atlantic (1982, status of stocks, fisheries).

Remarks : In the southern end of the range, the species known as Loligo reynaudi may be synonymous with L. vulgaris or a subspecies.

Sepioteuthis australis Quoy & Gaimard, 1832

LOLIG Sepio 2

Sepioteuthis australis Quoy & Gaimard, 1832, Zool.Astrolabe, 2(1):77.

Synonymy : Sepioteuthis bilineata Quoy & Gaimard, 1832.

FAO Names :

En - Southern reef squid
Fr - Calmar de roche austral
Sp - Calamar roquero austral

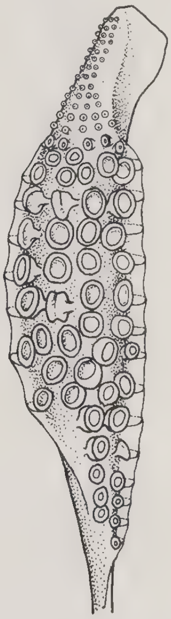
Diagnostic Features : Mantle robust. Fins very long, exceeding 90% of mantle length, but fin width less than 50% of fin length; greatest width of fins at about midpoint. Tentacular clubs long, not greatly-expanded; suckers moderate-sized with 22 to 27 sharp teeth around the rings of the largest. Arm III sucker rings with 25 to 30 sharp teeth. A narrow white to blue line occurs along the base of the fins where they attach to the body.

Geographical Distribution : Western Pacific: Australia and New Zealand.

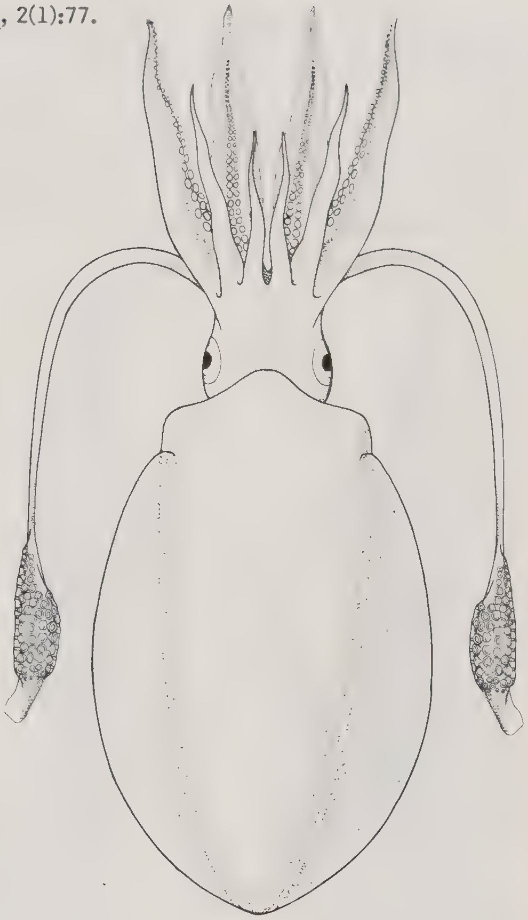
Habitat and Biology : A neritic, demersal species commonly found in depths from the surface to 10 m.

Size : Maximum mantle length 38 cm; maximum weight 1 kg.

Interest to Fisheries : In Australia, this squid is taken in local fisheries by set nets, hook-(lure) -and-line, trolls, and jigging; a larger-scale directed fishery is developing, but published information is meagre. In New Zealand, relatively low quantities are caught by trawl.



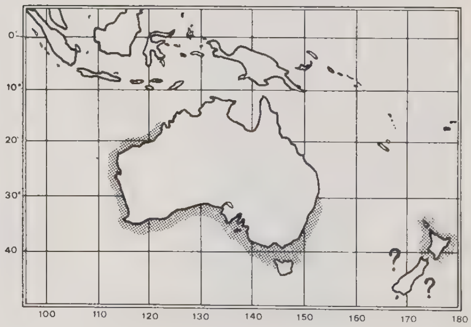
tentacular club



dorsal view

Local Names :

Literature : Okutani (1980); Dunning (1982, resources around Australia).



Sepioteuthis lessoniana Lesson, 1830

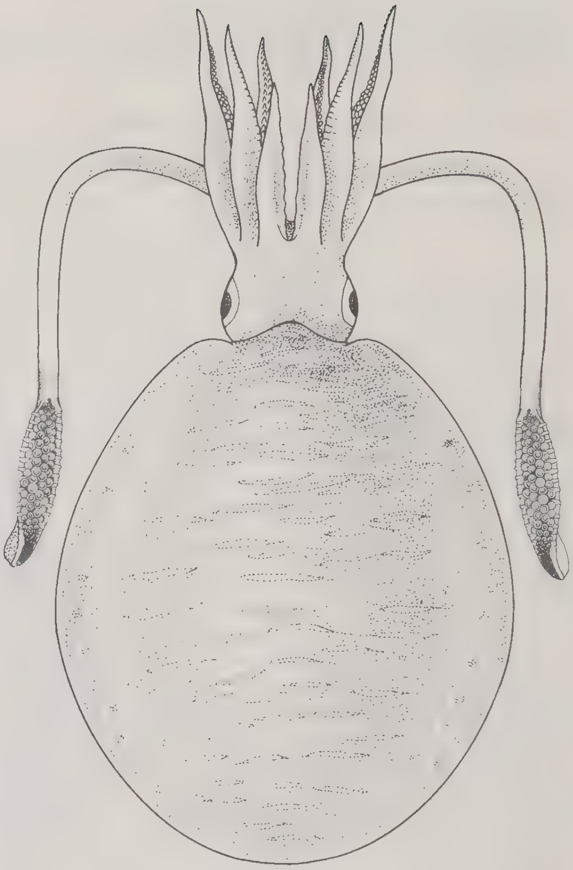
LOLIG Sepio 3

Sepioteuthis lessoniana Lesson, 1830, Voy.Coquille, 2(1):244.

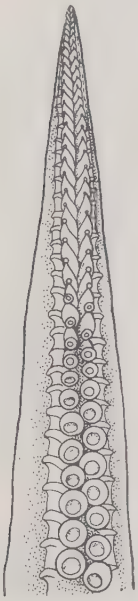
Synonymy : Sepioteuthis guinensis Quoy & Gaimard, 1832; Sepioteuthis lunulata Quoy & Gaimard, 1832; Sepioteuthis mauritania Quoy & Gaimard, 1832; Sepioteuthis sinensis Orbigny 1835-1848; Sepioteuthis arctipinnis Gould, 1852; Sepioteuthis brevis Owen, 1881; Sepioteuthis neoguinaica Pfeffer, 1884; Sepioteuthis indica Goodrich, 1896; Sepioteuthis sieboldi Joubin, 1898; Sepioteuthis malayana Wülker, 1913; Sepioteuthis krempfi Robson, 1928.

FAO Names : En - Bigfin reef squid
Fr - Calmar tonnelet
Sp - Calamar manopla

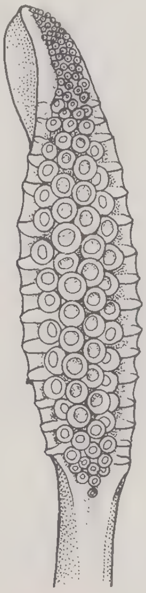
Diagnostic Features : Mantle long, robust, its width about 40% of length. Fins very large, their length over 90% up to nearly 100% of mantle length, their width up to 75% of mantle length; the greatest width occurs posterior to the midpoint of the fins. Tentacular clubs long, expanded; median manal suckers enlarged; rings with 14 to 23 sharp teeth. Arm sucker rings with 18 to 29 sharp, triangular teeth; tentacles long, robust; left arm IV hectocotylized along distal 1/3 to 1/4 of arm.



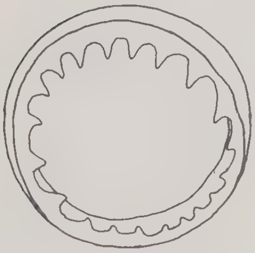
dorsal view



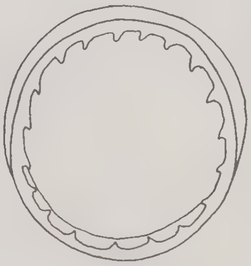
left arm IV
hectocotylized



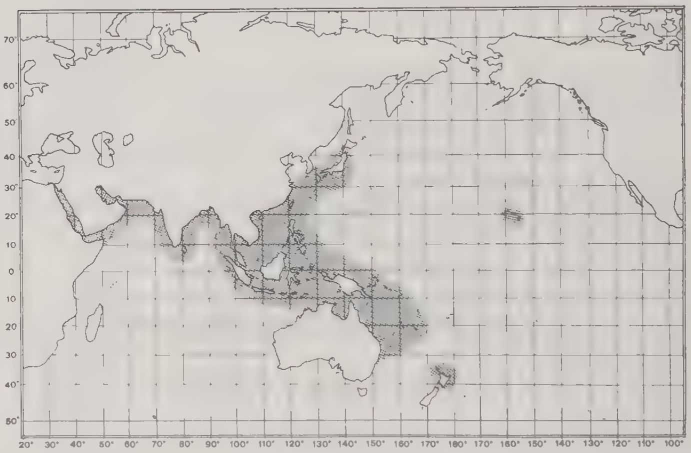
tentacular club



arm III
sucker ring



tentacular club
sucker ring



Geographical Distribution : Indo-Pacific: Red Sea, Arabian Sea east to 160°E, northern Australia and north to central Japan, eastward to the Hawaiian Islands.

Habitat and Biology : Sepioteuthis lessoniana is a neritic species occurring from the surface down to at least 100 m depth. The spawning season depends on the hydrographical conditions and can be quite extended. Egg capsules containing 3 to 7 eggs are finger-shaped and attached in clusters to seaweeds, twigs, stones and corals in coastal waters. Males attain sexual maturity at an age of 10 to 14 months, females at 12 to 17 months. Longevity is 2½ years. Males often outnumber females in the upper size classes.

Bigfin reef squid preys primarily on prawns and fishes, occasionally on stomatopods and crabs. Cannibalism is not very common.

Size : Maximum dorsal mantle length 36 cm, corresponding to a weight of about 1.8 kg. Off southern India, the maximum length is 33 cm. Length at first maturity is reported as 10 cm in males in Indian waters. Females mature within a length range from 8 to 20 cm (Silas, et al., 1982).

Interest to Fisheries : The species is of commercial value all over southeast Asia where it is captured throughout the year, with lure-hooks, seines or purse seines in inshore waters and by trawlers on the continental shelf. In western Japan and the Philippines, local fisheries utilize set nets, spears and jigs; the seasonal fisheries from May to September around Hong Kong use purse seines. It is also reported as one of the 4 loliginid species of the Chinese squid catch. It is commonly found in southern India, where the major fisheries concentrate around Palk Bay and the Gulf of Mannar in March through June using trawls and purse seines. It is also reported to be the most common cephalopod species in Sri Lanka where it is caught with scoop-nets and beach seines (Ma-dels). It is marketed all along the coast, mostly fresh, some sun-dried.

Local Names : CHINA: Daai mei yau yue; JAPAN: Aoriika, Bashouika, Izuika, Kutsuika, Mizuika, Moika, Shiroika.

Literature : Tomiyama & Hibiya (1978); Silas et al. (1982, biology, India).

Remarks : This species has successfully been reared in aquaculture experiments (Choe, 1966).

Sepioteuthis sepioidea (Blainville, 1823)

LOLIG Sepio 1

Loligo sepioidea Blainville, 1823, J.Phys.Chim.Hist.Nat., 96:133.

Synonymy : Loligo sepioidea Blainville, 1823; Sepioteuthis biangutata Rang, 1837; Sepioteuthis sepioidea Orbigny, 1839; Sepioteuthis sloani Leach, 1849; Sepioteuthis ovata Gabb, 1868; Sepioteuthis ehrhardti Pfeffer, 1884; Sepioteuthis accidentalis Robson, 1926.

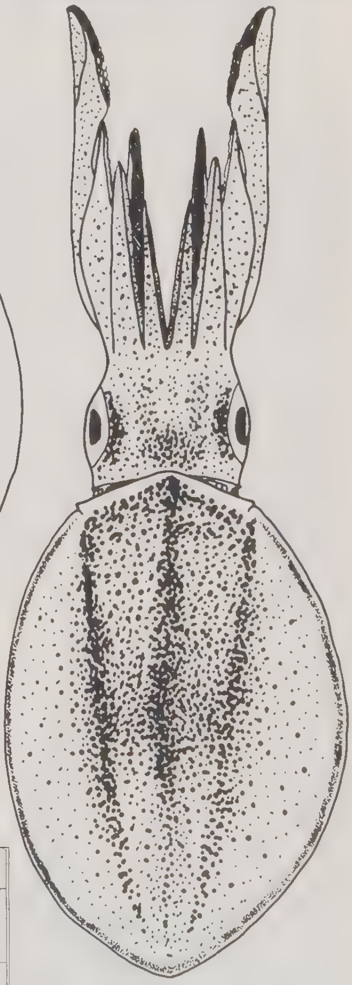
FAO Names :
En - Caribbean reef squid
Fr - Calmar ris
Sp - Calamar de arrecife

Diagnostic Features : Mantle broad, relatively stout, tapered to a blunt posterior end, widest at anterior opening. Fins occupy nearly the entire length of mantle (90% in adults, 75% in juveniles) and are elliptical to weakly rhomboidal, their width about 65% of mantle length. Buccal lappets without suckers. Modified portion of hectocotylized (left ventral) arm IV occupies distal fourth of arm length and is characterized by sudden reduction in size of one or 2 pairs of suckers, the complete absence of suckers in both rows from the remaining distal portion of the arm, and the increase in size of the pedicels into large, fleshy papillae.

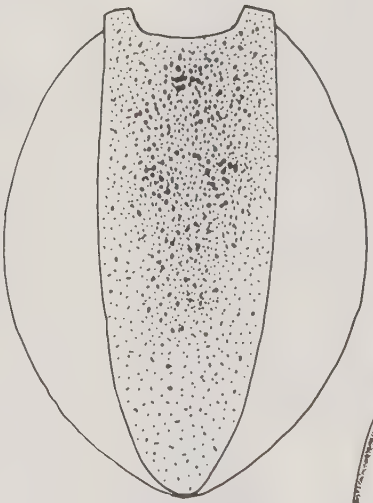
Geographical Distribution : Tropical western north Atlantic: Cape Canaveral, Florida to Venezuela, throughout the Caribbean Sea.

Habitat and Biology : A tropical shallow-water species ranging from the surface and about 20 m depth, most abundant between 3 and 7 m. It occurs exclusively associated with coral reefs and Thalassia grass flats.

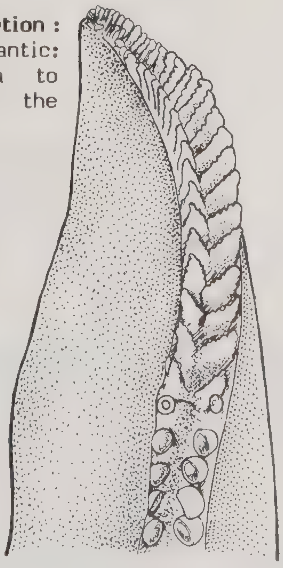
Reef squids form small schools of 4 to 50 equally-sized individuals cruising around the reefs and over the flats. Spawning takes place throughout the year. The eggs are very yolky and large, 5 or 6 mm long. Only



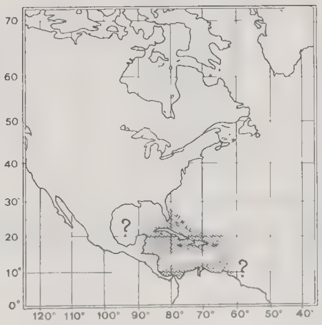
dorsal view



ventral view
of mantle and fins



left arm IV
hectocotylized



3 or 4 eggs are encased in each gelatinous capsule and several capsules are attached together at their bases and deposited in clusters under rocks or in conch shells (Strombus gigas). The diet of this species includes shrimps and small fishes.

Size : Maximum mantle length 20 cm. Maturity is attained at approximately 9 cm, but the smallest males (immature) with a hectocotylized arm measure only 3 cm mantle length.

Interest to Fisheries : Taken only in subsistence fisheries throughout its range, using spears, night light and dip nets or lift nets. Separate statistics are not reported for this species. Consumed fresh.

Local Names :

Literature : Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31).

Alloteuthis africana Adam, 1950

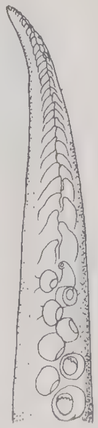
LOLIG Allot 1

Alloteuthis africana Adam 1950, Bull.Inst.Sci.Nat.Belg., 26(45):1.

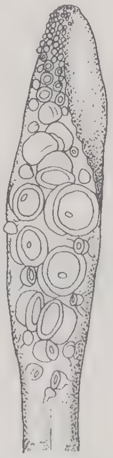
Synonymy : None.

FAO Names : En - African squid
Fr - Casseron africain
Sp - Calamarín africano

Diagnostic Features : Mantle long and narrow, mantle width index (mantle width as percentage of dorsal mantle length) 20 to 25% in juveniles, 15% in adult females, 5% in adult males; anterior ventral mantle margin squarish in outline. Tail (fins and posterior mantle projection) very long and pointed in females (37% of dorsal mantle length in juveniles and 58% in adults) and extremely long and spike-like in males (35% in juveniles, 73% in adults). Fins oval in outline, fin width index (width of both fins as a percentage of dorsal mantle length) 23% in adult females and 10% in adult males; posterior border of fins concave; arms very short; buccal lappets without suckers. Diameters of club suckers of median 2 rows 3 times greater than lateral ones, sucker rings with 20 to 30 blunt teeth. Left ventral arm (IV) hectocotylized by modification of distal 2/5 of length; 8 to 11 pairs of normal suckers proximally followed by 2 longitudinal rows of more or less elongate papillae that gradually decrease in size distally; arm suckers with 6 to 10 square teeth on distal half, smooth on proximal half.

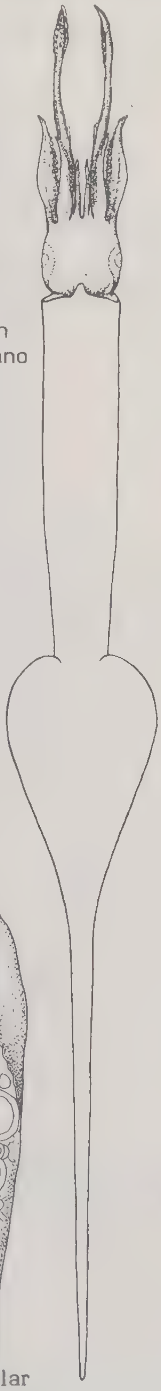


left arm IV hectocotylized

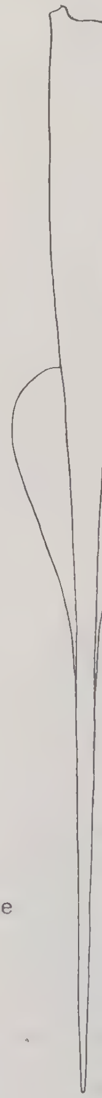


tentacular club

Geographical Distribution : Eastern Atlantic: from 20°S to 25°N.

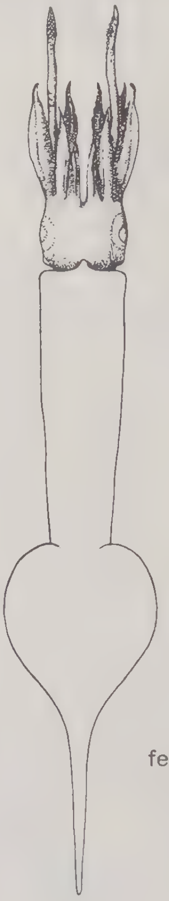


dorsal view

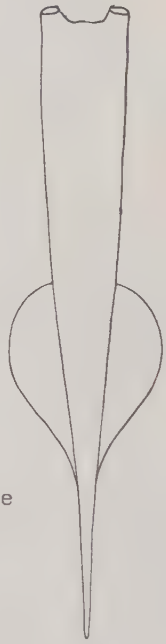


ventral view

male

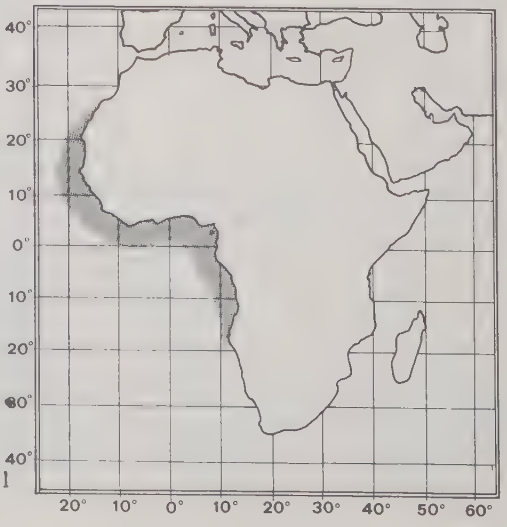


dorsal view



ventral view

female



Habitat and Biology : A neritic demersal species, spawning on the bottom. It feeds on small fishes. Males grow considerably larger than females.

Size : Maximum mantle length 19 cm in males; 9 cm in females.

Interest to Fisheries : Bycatch in local trawl fisheries. Separate statistics are not reported for this species.

Local Names :

Literature : Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part).

Alloteuthis media (Linnaeus, 1758)

LOLIG Allot 3

Sepia media Linnaeus, 1758, *Syst.Nat.*, 659.

Synonymy : *Sepia media* Linnaeus, 1758; *Loligo marmorae* Verany, 1877.

FAO Names :

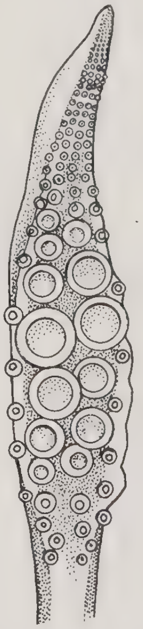
En - Midsize squid
Fr - Casseron bambou
Sp - Calamarín menor

Diagnostic Features : Mantle long, relatively narrow, its posterior end drawn out into a narrow, pointed tail, up to 6 cm long in adults. Fins heart-shaped, their lateral angles rounded, posterior borders concave, extending posteriorly along tail. Buccal suckers absent. Tentacles long, robust; clubs large, expanded, with large suckers in the 2 median manal rows. Left arm IV hectocotylized: 10 to 12 (usually 11) normal suckers in median row followed by coarse papillae.

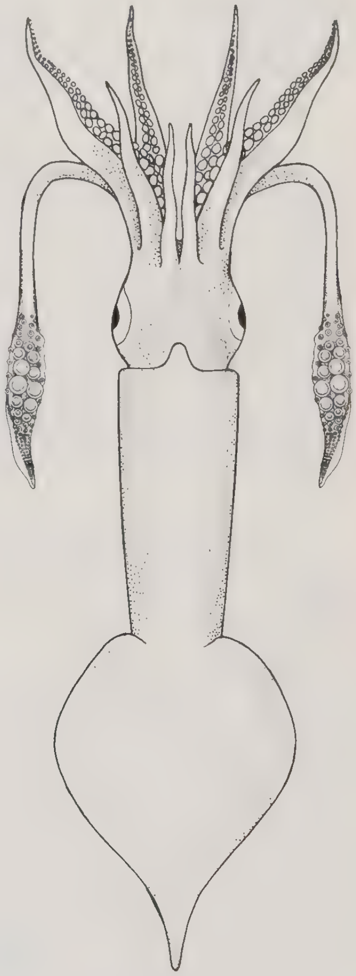
Geographical Distribution : Eastern Atlantic: Irish Sea, English Channel (very rare in North Sea) south into Mediterranean Sea.

Habitat and Biology : A neritic, demersal species on sandy and muddy grounds occurring over a depth range from the surface to 350 m, usually between 20 and 200 m.

Like other neritic squids, it performs seasonal migrations between offshore and inshore areas. In the Mediterranean, spawning extends throughout the year, but two groups of spawners can usually be distinguished by size and time of peak spawning, even though mixing occurs. Large individuals are encountered in February at depths between 150 and 200 m; from March to April, they start migrating into shallower waters, where spawning takes place on sandy grounds and to a minor extent, in *Posidonia* grass beds. The second group, composed of smaller individuals, migrates onshore in June and July and spawn later in the year. By late fall, depending on environmental temperatures, they start returning to deeper waters.



tentacular club

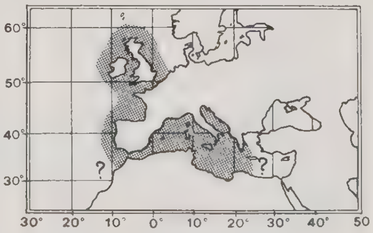


dorsal view

Large males may carry up to 170 spermatophores, large females 8 to 30 eggs. The eggs are shed in several batches and are encapsuled in rather short gelatinous strings (each containing up to 1 400 eggs) which are attached in batches of up to 12 to hard objects on the substrate (shells, corals, stones).

This squid feeds on crustaceans, molluscs and small fishes. Longevitiy is about 1 year in males, $1\frac{1}{2}$ years in females.

Size : Maximum mantle length 12 cm; females grow bigger than males. Length at first maturity is about 9.5 cm in females, and 5.5 cm in males.



Interest to Fisheries : An active trawl fishery exists for this species in the western Mediterranean, where it is taken between 150 and 200 m depth in winter, and in shallower waters (50 to 150 m) in spring, summer and fall. Some landings of this species may be registered as *Loligo vulgaris*.

Local Names : FRANCE: Petit encornet; ITALY: Totariello; MONACO: Totanitu; SPAIN: Luria; UK: Little squid.

Literature : Mangold-Wirz (1963, biology, Mediterranean).

Alloteuthis subulata (Lamarck, 1798)

LOLIG Allot 2

Loligo subulata Lamarck, 1798, *Bull.Soc.Philom.Paris*, 2:130.

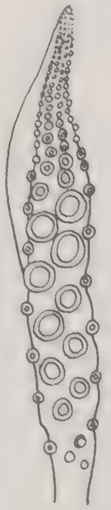
Synonymy : *Loligo subulata* Lamarck, 1798.

FAO Names : En - European common squid
Fr - Casseron commun
Sp - Calamarín picudo

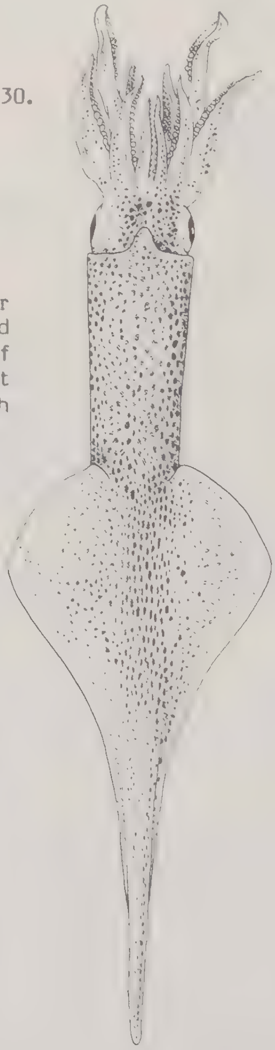
Diagnostic Features : Mantle long and narrow, anterior ventral mantle margin shallowly curved; tail long and pointed in adult females (length of posterior extension plus fins 66% of dorsal mantle length) and very long and spike-like in adult males (72% of dorsal mantle length). Fins rhombic, with pointed lateral angles, their posterior borders concave and extending along tail; buccal lappets without suckers; tentacles short, delicate; clubs small, narrow, median manal suckers small. Arms are medium to short; left ventral arm IV hectocotylyzed, with 6 to 8 pairs of normal suckers proximally, followed distally by 2 longitudinal rows of fine papillae.

Geographical Distribution : Eastern Atlantic: North Sea and western Baltic Sea south to the Sahara Banks, extending into the Mediterranean Sea.

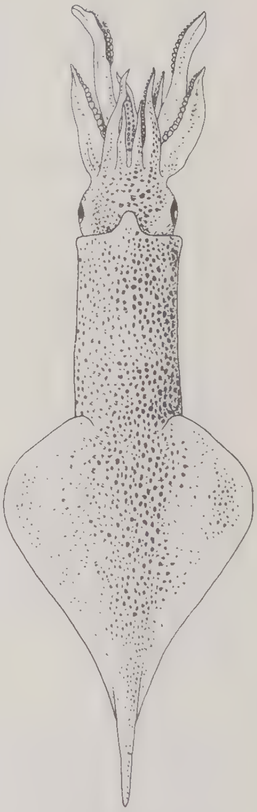
Habitat and Biology : A neritic, demersal species, usually associated with sandy and hard bottoms, occurring in depths down to 200 m. In the North Sea, males and females arrive together in inshore waters in early summer. The sole spawning season is restricted to June and July. Eggs are encapsuled in gelatinous strings which are attached to various hard objects on the substrate. Juveniles of 2 mm length hatch after a few weeks; they first occur in plankton samples towards the end of July; after about 15 to 30 days they shift to the demersal life habits of the adults; by November, at an age of 3 months (size about 3 cm), they leave the North Sea to return only in the following spring (size about 5 cm). Longevity is between 1 and 2 years. The species feeds on small and juvenile fishes.



tentacular club



male
dorsal view

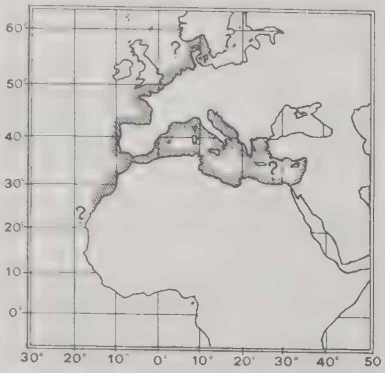


female
dorsal view

Size : Maximum mantle length 20 cm in males, 12 cm in females.

Interest to Fisheries : Taken as bycatch in trawl fisheries throughout its range. In the Mediterranean Sea, the species is caught between 20 and 120 m depth over sandy-muddy bottoms. Marketed fresh and frozen. Separate statistics are not reported, but catches are probably reported as *Loligo vulgaris*.

Local Names : ITALY: Calamaretto.



Literature : Mangold-Wirz (1963, biology, western Mediterranean); Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part).

Remarks : Often misidentified as juvenile Loligo forbesi and L. vulgaris.

Uroteuthis bartschi Rehder, 1945

LOLIG Uro 1

Uroteuthis bartschi Rehder, 1945, Proc.Biol.Soc.Wash., 58:22.

Synonymy : None.

FAO Names :
En - Bartsch's squid
Fr - Calmar tépo
Sp - Calamarete

Diagnostic Features : Mantle very narrow, elongate, with very long, pointed tail. Fins rhomboidal, their lateral angles rounded, posterior borders concave, extending the entire length of tail. Head relatively small, narrow. Left arm IV hectocotylized in distal half by abrupt transformation of suckers into long, stout papillae (pedicels), the first few (1 or 2) each set with a minute, fleshy sucker.

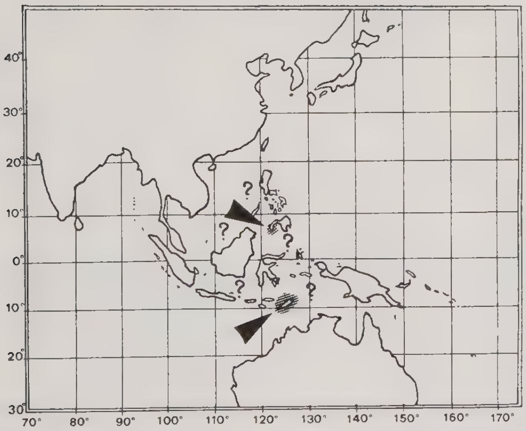
Geographical Distribution : Western Pacific Ocean: in Philippine and Indonesian waters.

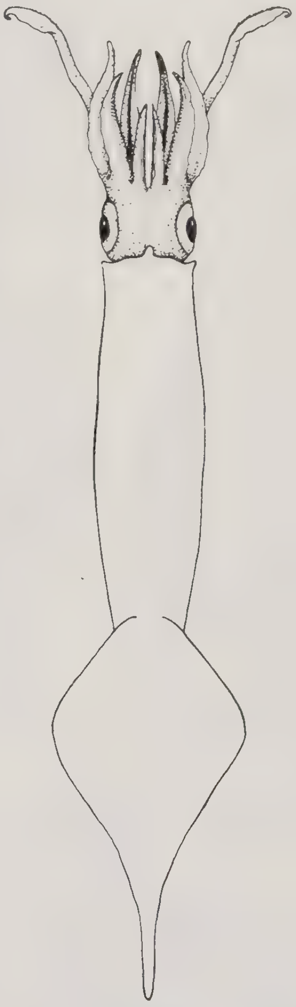
Habitat and Biology : A neritic species; upper and lower limit of depth distribution undetermined.

Size : Maximum mantle length 20 cm.

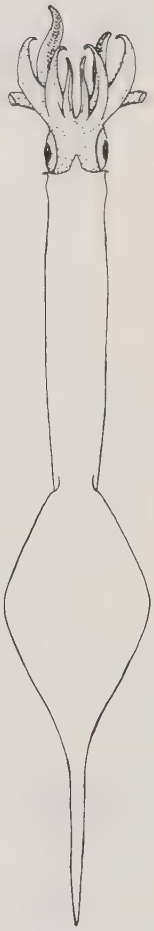
Interest to Fisheries : Taken as bycatch in local trawl fisheries. Utilized mostly fresh.

Local Names :





female
dorsal view



male
dorsal view

Lolliguncula brevis (Blainville, 1823)

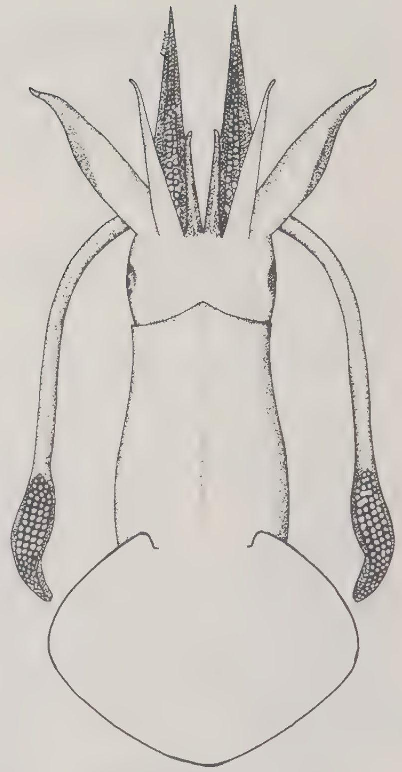
LOLIG Lolligun 1

Loligo brevis Blainville, 1823, J.Phy.Chim.Hist.Nat., 96:133.

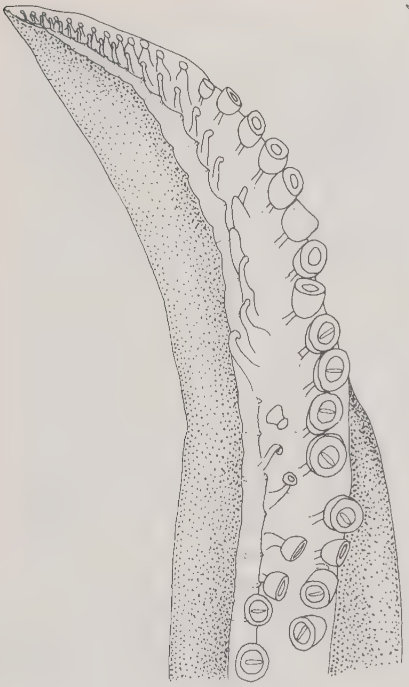
Synonymy : Loligo brevis Blainville, 1823; Loligo brevipinna Lesueur, 1824; Loligo hemiptera Howell, 1868.

FAO Names : En - Western Atlantic brief squid
Fr - Calmar doigtier commun
Sp - Calamar dedal

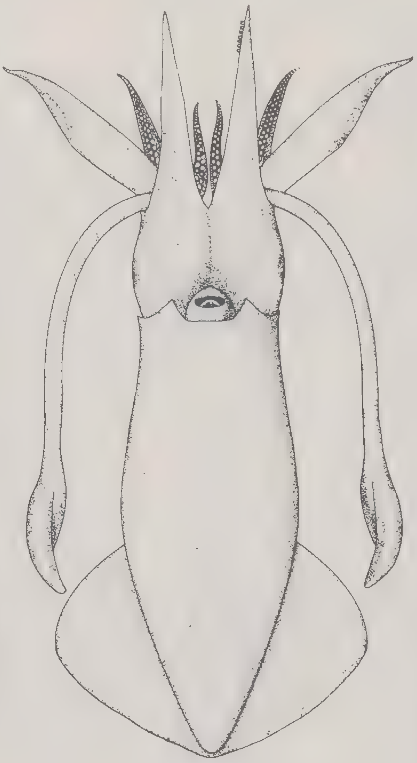
Diagnostic Features : Mantle stout, bluntly rounded posteriorly, widest in mid-portion. Fins broad, wider than long (fin with 75% of mantle length), very rounded, short (50 to 55% of mantle length). Modified portion of hectocotylized (left ventral) arm IV occupies distal third of arm and extends to arm tip; about 24 suckers of dorsal row modified, the proximal 1 to 3 being greatly reduced in diameter, the remaining pedicels distally are greatly enlarged with long, slightly flattened papillae that gradually diminish in size distally; no large, puffy, glandular enlargement of basal area of arm between sucker rows.



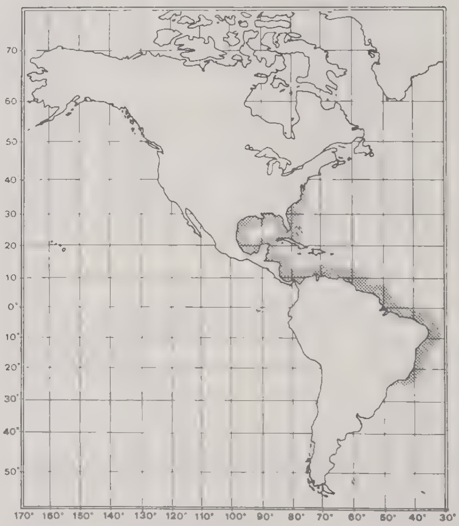
dorsal view



left arm IV of male hectocotylized



ventral view



Geographical Distribution : Western Atlantic (40^{0}N to 23^{0}S): mid-Atlantic states, Gulf of Mexico, Caribbean Sea, northeastern South America, occasionally as far south as Argentina.

Habitat and Biology : A neritic, coastal species restricted to very shallow water of at most 20 m depth and to waters within a temperature range between 15 and 32^{0}C. It tolerates salinities as low as 8.5^{0}/oo for brief periods and is particularly abundant in shallow bays and estuaries. Spring migration into estuaries is largely influenced by temperature and salinity, while fall emigration is closely associated with a decline in water temperature. Monthly variations in abundance are related with seasonal fluctuations in estuarine zooplankton abundance, and not with environmental variables (T,S).

The small eggs are laid in elongate, terminally rounded, gelatinous capsules attached to the bottom in shallow waters. Food consists of zooplankton, small crustaceans and fishes.

Size : Maximum mantle length 12 cm in females, 8 cm in males.

Interest to Fisheries : Taken as bycatch in otter trawl fisheries for shrimp and fin-fish. Locally very abundant. Utilized as food and bait (fresh and frozen); a very meaty species, considered ideal for canning.

Local Names : USA: Brief squid, Thumbstall squid, Western Atlantic brief squid.

Literature : Barragan (1969, food, Colombia); Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31); Laughlin & Livingston (1982, distribution off north Florida, USA).

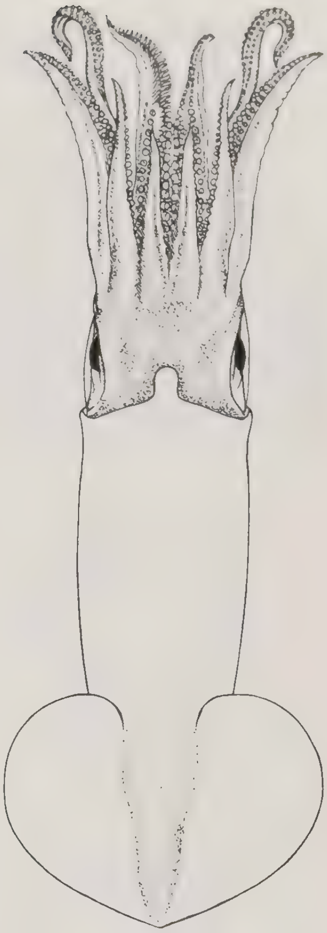
Lolliguncula mercatoris Adam, 1941

LOLIG Lolligun 2

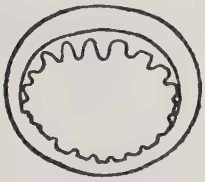
Lolliguncula mercatoris Adam, 1941, Mem.Mus.Roy.Hist.Nat.Belg., (2)21:125.

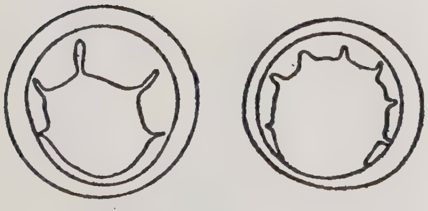
Synonymy : None.

FAO Names :
En - Guinean thumbstall squid
Fr - Calmar doigtier de Guinée
Sp - Calamar dedal de Guinea


dorsal view

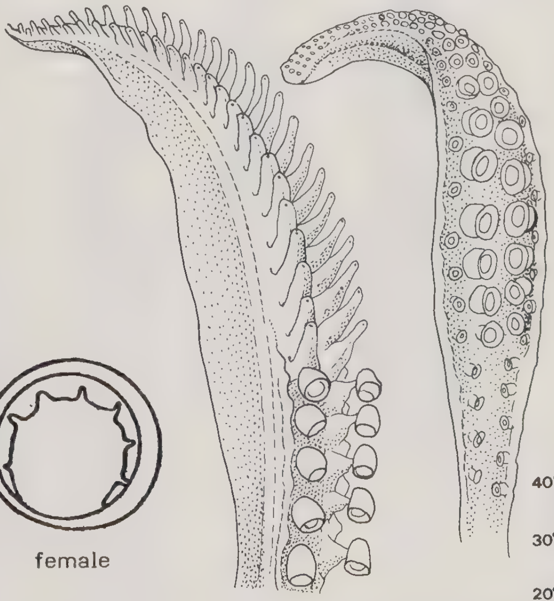
Diagnostic Features : Mantle broad (its width about 35% of dorsal mantle length), and bluntly rounded posteriorly. Fins rounded, short (their length 40 to 45% of dorsal mantle length), broad (width of both fins about 55 to 65% of dorsal mantle length) with convex posterior margins. Head short; buccal lappets without suckers. Tentacular clubs narrow, small, with suckers arranged in 4 longitudinal rows, 4 or 5 pairs of medial suckers on manus much larger than the laterals; club sucker rings with 15 to 25 more or less sharp teeth, larger, more pointed distally. Dorsal arms (I) extremely short in comparison to the others; left ventral arm (IV) of males hectocotylized, its proximal half with 6 to 12 pairs of normal suckers, its distal half with elongate papillae replacing the suckers, those of the dorsal row more strongly developed. Spermatophore pad of females located in mantle cavity, near gill.


tentacular club sucker ring

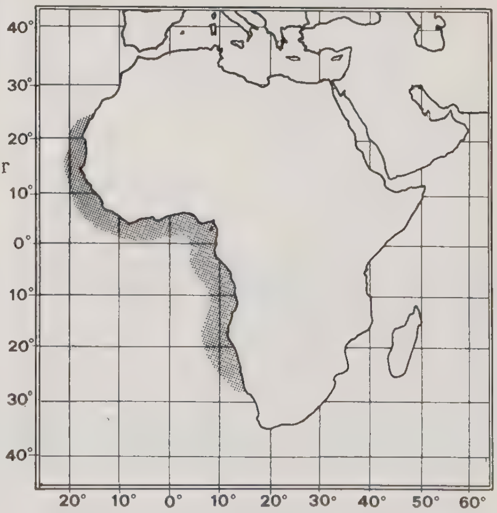

male

female

arm III sucker rings


left arm IV of male hectocotylized

tentacular club



Geographical Distribution : Eastern central Atlantic: limited to the west coast of Africa from Rio de Oro (Mauritania) to Lüderitz Bay (Namibia).

Habitat and Biology : A neritic, near-shore, shallow water species taken at depths of less than 50 m on mud and sandy mud bottoms.

Size : Maximum mantle length 5 cm in females, 3.5 cm in males.

Interest to Fisheries : Currently not exploited, incidentally taken as bycatch. However, should abundance, habitat, and distribution prove to be similar to those of L. brevis in the western central Atlantic, a fishery could develop.

Local Names :

Literature : Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part).

Lolliguncula panamensis Berry, 1911

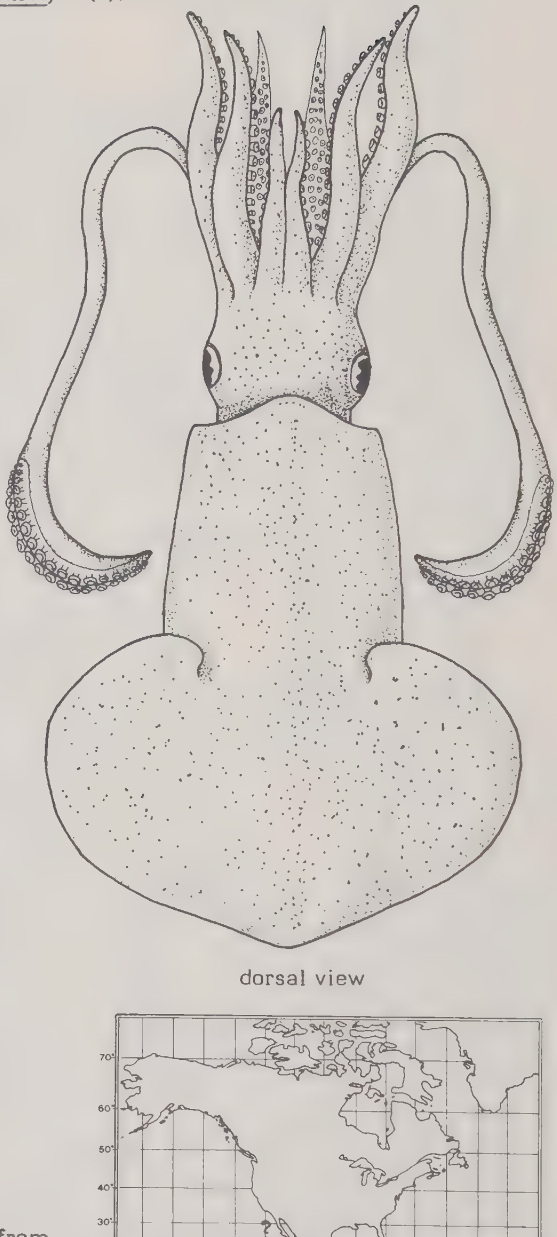
LOLIG Lolligun 3

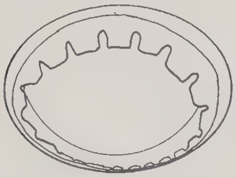
Lolliguncula panamensis Berry, 1911, Proc.Acad.Nat.Sci., Phila., 63(1):100.

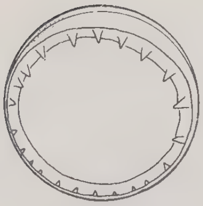
Synonymy : None.

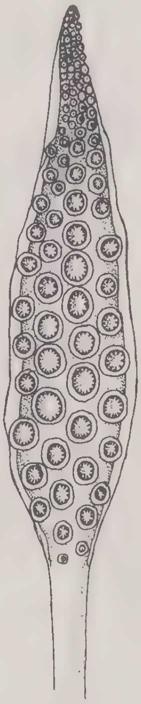
FAO Names :
En - Panama brief squid
Fr - Calamar doigtier panaméen
Sp - Calamar dedal panameño

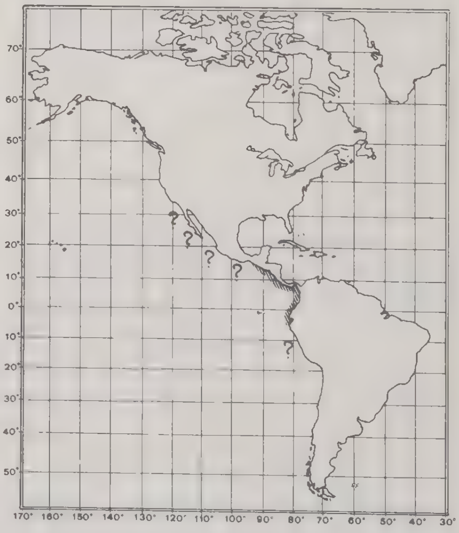
Diagnostic Features : Mantle stout, robust, bluntly rounded posteriorly. Fins broad, round, their length 55 to 60% of mantle length, width 85 to 90% of mantle length. Tentacles long, robust; clubs large, expanded, with enlarged suckers in manus, especially the median rows with 23 to 27 small, sharp, triangular teeth around the ring (smaller proximally); arm suckers with 11 to 15 short, broad, truncate teeth that are prominent distally and obscure proximally. Left arm IV hectocotylized, but undescribed.


dorsal view


arm III
sucker ring


tentacular club
sucker ring


tentacular
club



Geographical Distribution : Eastern Pacific: Reported from Baja California to northern Peru, but limits unconfirmed.

Habitat and Biology : A neritic, coastal species occurring over a depth range of 1 to 70 m, usually between 5 and 30 m, at temperatures from 21 to 27°C, and salinities between 15 and 23°/oo. Spawning seems to take place throughout the year, apparently in several batches. The diet consists of fishes (80%) and crustaceans (> 15%).

Size : Maximum mantle length 11 cm in females, 8 cm in males. Females mature at 8 cm, males at 4 cm.

Interest to Fisheries : Taken as bycatch in shrimp fisheries off Panama, Colombia and Ecuador, but not separately reported in catch statistics. The largest individuals are picked out of the catch, packed and frozen to be exported to Europe.

Local Names :

Loliolopsis diomedeae (Hoyle, 1904)

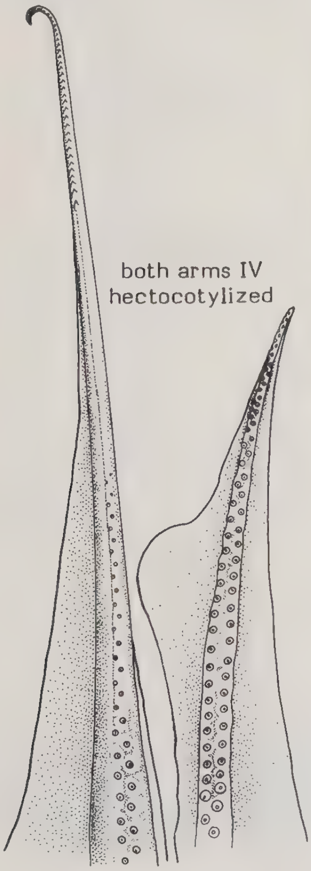
LOLIG Lolio 1

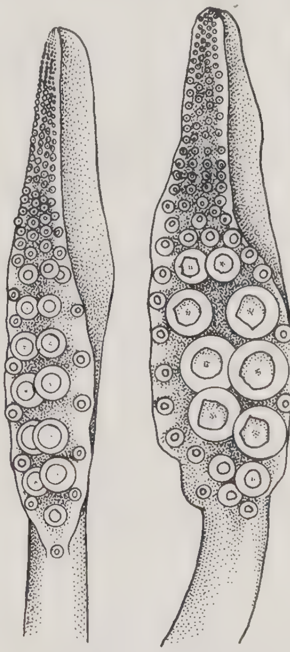
Loligo diomedeae Hoyle, 1904, Bull.Mus.Comp.Zool., 43(1):29.

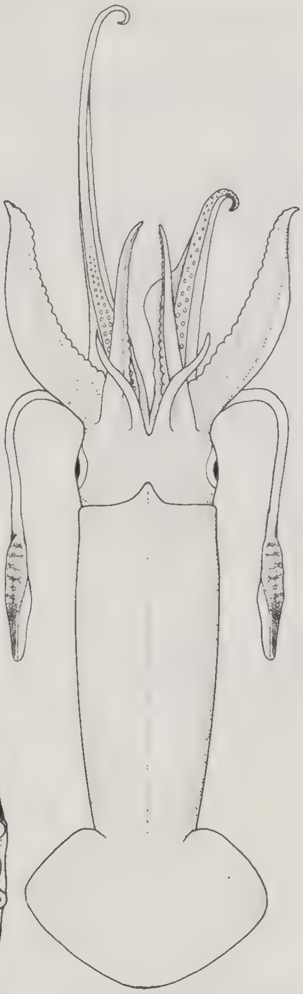
Synonymy : Loligo diomedeae Hoyle, 1904; Loliolopsis chiroctes Berry, 1929.

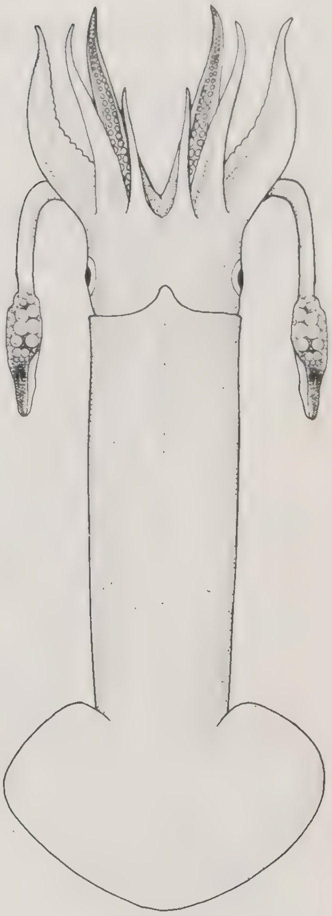
FAO Names :
En - Dart squid
Fr - Calmar fléchette
Sp - Calamar dardo

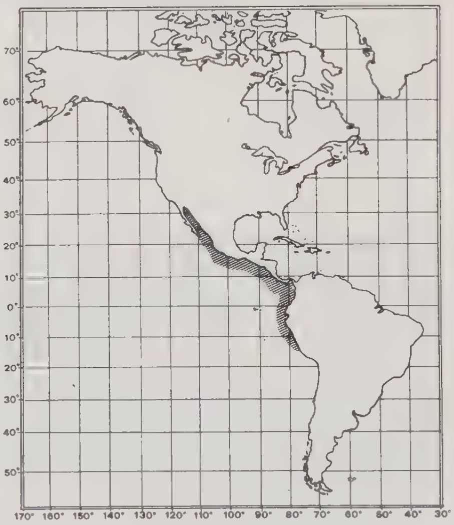
Diagnostic Features : Mantle long, bluntly pointed posteriorly. Fins hear-shaped to rounded (subrhombic), short, their length approximately one third of mantle length. Sexes dimorphic: female with larger body, relatively shorter arms and larger fins than males; both arms IV hectocotylized in males: left arm IV greatly elongate into a whip-like appendage with suckers minute at the base and absent along the rest of the arm; sucker stalks modified to papillae; right arm IV with suckers of reduced size and a broad, membranous flap on the ventral keel.


both arms IV hectocotylized


male female
tentacular club


male
dorsal view


female
dorsal view



Geographical Distribution : Eastern central Pacific: From Baja California to Peru.

Habitat and Biology : A neritic species frequently forming large aggregations in the Gulf of Panama. Females appear to outnumber males 2:1.

Size : Maximum mantle length 11.5 cm; males remain smaller than females.

Interest to Fisheries : Taken as bycatch in the Panamanian shrimp fishery, but usually discarded; small quantities reach the local market.

Local Names :

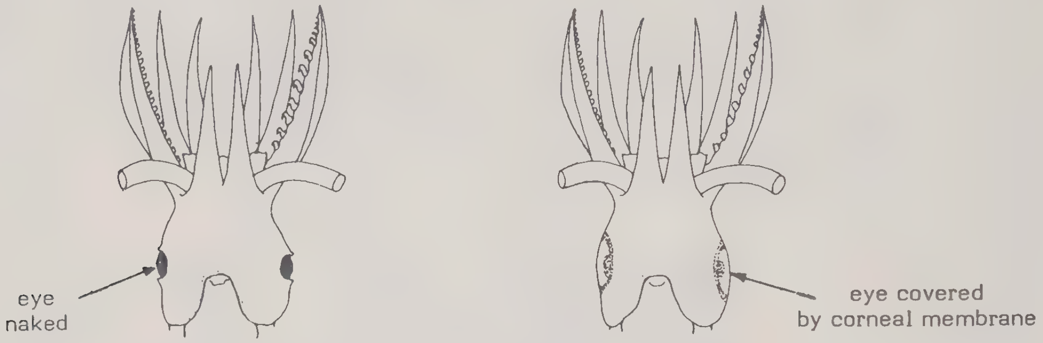
Literature : Brakoniecki (1980, systematics, separation from Lolliguncula).

Suborder Oegopsida Orbigny, 1845

Oegopsida - Orbigny, 1845, Moll.Viv.Foss., 1:367.

Twenty three families compose the suborder Oegopsida or oceanic squids, several of which support the major cephalopod fisheries of the world. The suborders Oegopsida and Myopsida apparently diverged from the basic teuthoid stock in the Lower Jurassic.

Diagnostic Features : Oegopsid squids are distinguished from myopsid squids by their lack of a corneal membrane, thus exposing the eyes directly to the sea; suckers are absent on the buccal lappets (except in Bathyteuthidae and Ctenopterygidae); sucker ornamentation consists of chitinous rings and/or hooks; female gonoducts are paired; accessory nidamental glands are absent.



Ommastrephidae,
and other commercial
squid families

Loliginidae

4.2 **FAMILY ENOPLOTEUTHIDAE** Pfeffer, 1900

ENOP

Enoploteuthidae Pfeffer, 1900, Mitt.Nat.Mus., 17:163.

FAO Names : En - Enope squids
Fr - Encornets
Sp - Enoplolurias

General Remarks on the Family : This family contains 2 commercially exploited species taken in Japan and Australia. A third species is known to be used in Singapore, but no data are available. The Enoploteuthidae are divided into three long-established subfamilies: Enoploteuthinae (Enoploteuthis, Abralia, Abraliopsis, Watasenia), Pyroteuthinae (Pyroteuthis, Pterygioteuthis), and Ancistrochirinae (Thelidioteuthis, Ancistrocheirus).

Diagnostic Features : All members of this large family possess a straight locking apparatus; biserial armature (except occasionally at the arm tips) with at least some hooks on the arms; tetraserial armature on the clubs (marginal suckers of the manus may be lost with growth in some species); photophores; 8 buccal lappets and buccal connectives that attach dorsally to the ventral arms (Enoploteuthis dubia Adam, 1960, is unique in having connectives that attached dorsally to all arms). All species, except those of the genus Pterygioteuthis, possess hooks on the tentacular clubs.

Geographical Distribution : Enoploteuthids primarily are mesopelagic inhabitants of the tropical and subtropical oceans of the world. Some species of the genera Pterygioteuthis, Abraliopsis, and Watasenia, however, inhabit temperate waters as well.

Ancistrocheirus lesueuri (Orbigny, 1839)

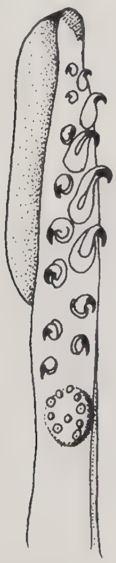
ENOP Anci 1

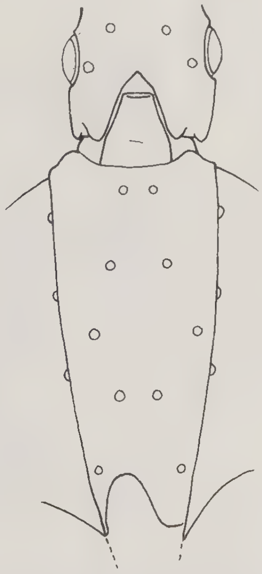
Onychoteuthis lesueurii Orbigny, 1839, in 1834-1848, Hist.Nat.Ceph.Acet.Viv.Foss., Atlas, Onychoteuthis, pl. 11.

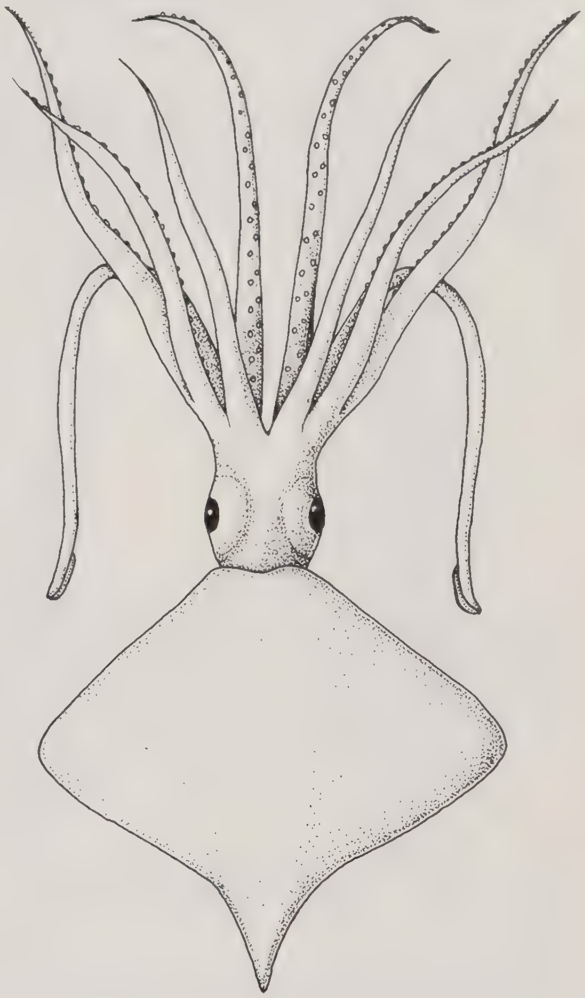
Synonymy : Onychoteuthis lesueurii Orbigny, 1839; Theliodioteuthis alessandrini (Verany, 1851).

FAO Names :
En - Sharpear enope squid
Fr - Encornet cachalot
Sp - Enoploluria rómbica

Diagnostic Features : Mantle long, broad, conical, thick-walled. Fins thick, rhomboidal, long (70 to 80% of mantle length), broad (80% of mantle length). Tentacles robust with 12 photophores along the aboral side of the stalk; clubs narrow, unexpanded, with a distinct carpal cluster; manus with 2 rows of sharp hooks, the 7 or 8 of the ventral row being larger than the 8 of the dorsal row. Arms robust, relatively short, with 2 rows of hooks instead of suckers. Ventral surface of mantle studded with 20 to 22 relatively large, separated photophores arranged in transverse rows.


tentacular club


ventral view showing photophores posterior end damaged


dorsal view

Geographical Distribution : Worldwide in tropical and temperate open ocean waters.

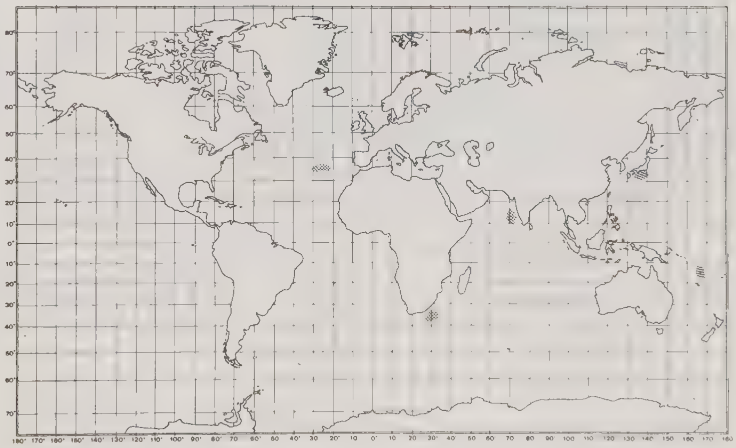
Habitat and Biology : An oceanic species.

Size : Maximum mantle length 39 cm.

Interest to Fisheries : This species is believed to have some fishery potential because of its size.

Local Names :

Remarks : It is suspected that Theliodioteuthis alessandrini (Verany, 1851) which is very abundant in warm waters is the juvenile form of this species.



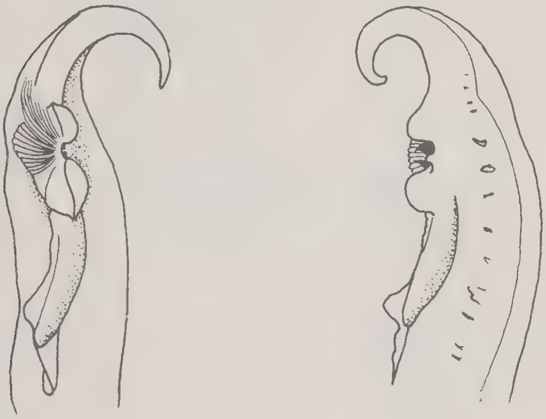
Pterygioteuthis giardi Fischer, 1895

Pterygioteuthis giardi Fischer, 1895, J.Conch., 43(4):211.

Synonymy : None.

FAO Names : En - Roundear enope squid
Fr - Encornet boubou
Sp - Enoploluria orejuda

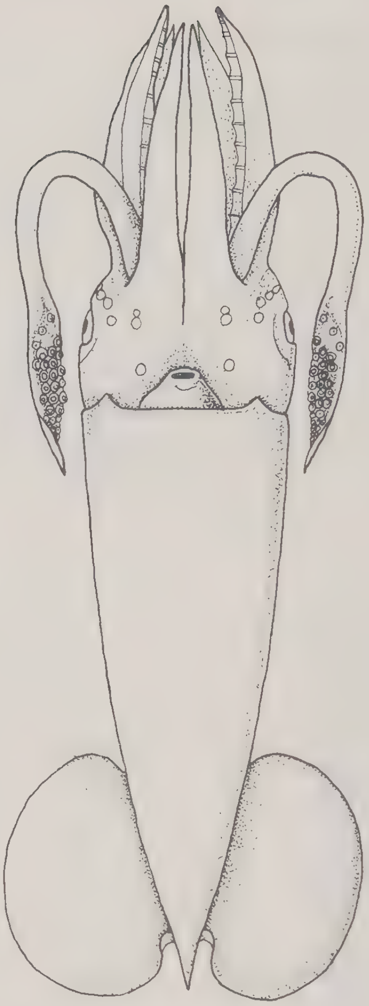
Diagnostic Features : Mantle small, tapered to a short sharp tail. Fins rounded with large lobes; fins do not meet posteriorly. Ventral surface of each eye studded with 15 irridescent photophores. Tentacular clubs with suckers only, no hooks. Arms I to III with 2 rows of hooks; arms IV with a few hooks, but no suckers; left arm IV hectocotylized.



oral view

side view

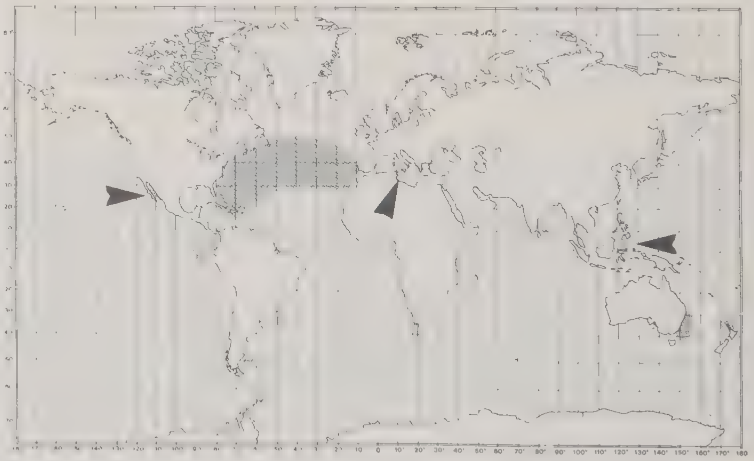
left arm IV hectocotylized



ventral view

Geographical Distribution : Worldwide in warm oceanic waters.

Habitat and Biology : A predominantly oceanic species with a depth distribution ranging from just below the surface to about 500 m; known to undertake diel vertical migrations: off Bermuda is it found in 250 to 500 m by day and in 50 to 250 m at night. The species is preyed upon by large dolphins (Tursiops truncatus), and pelagic fishes.



Size : Maximum mantle length 4 cm.

Interest to Fisheries : None at present.

Local Names :

Watasenia scintillans (Berry, 1911)

ENOP Wata 1

Abraliopsis scintillans Berry, 1911, *Nautilus*, 25(8):93.

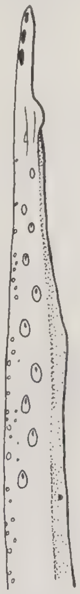
Synonymy : *Abraliopsis joubini* Watabé, 1905; *Abraliopsis scintillans* Berry, 1911.

FAO Names : En - Sparkling enope squid
Fr - Encornet lumière
Sp - Enoploluria centellante

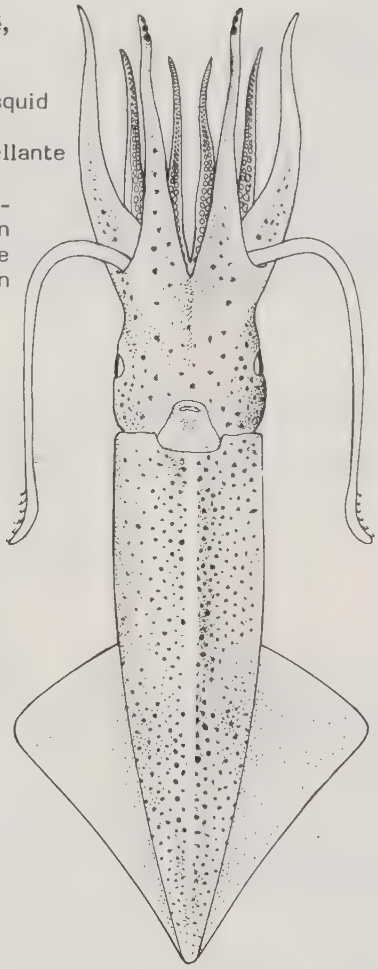
Diagnostic Features : Size small. Mantle stocky. A few large hooks in one row on tentacular club. Arms with hooks. Mantle covered with numerous, minute photophores on ventral and lateral surface, but with ventral midline devoid of photophores. Fins rhomboidal, about 60% of mantle length. Minute photophores also present on ventral surface of head; 5 on ventral surface of eyeball; 3 bulbous, black photophores on tips of arms IV.

Geographical Distribution : Western Pacific: Japan and Korea.

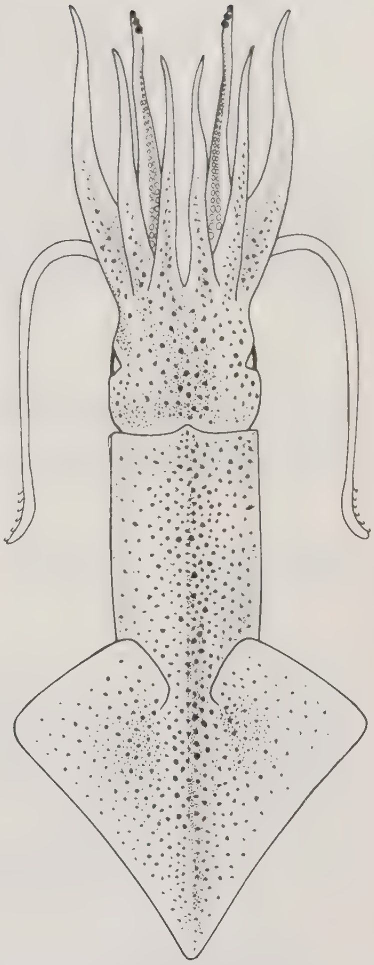
Habitat and Biology : A primarily oceanic luminescent species, usually encountered in depths between 200 and 600 m, spawning in waters closer to the shore, e.g. Toyama Bay, Japan. Postspawning mortality is high and the life span is believed not to exceed 1 year. It is preyed upon by baleen whales, other marine mammals, Alaska pollack, *Teragra chalcogramma*, and constitutes 8% by volume of the diet of northern Pacific fur seal.



left arm IV hectocotylized



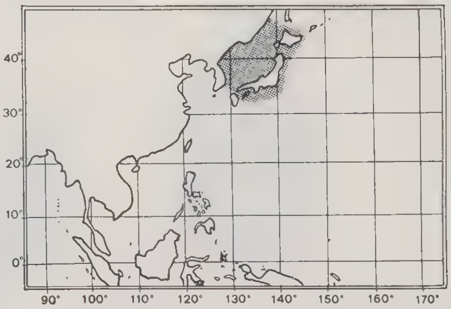
ventral view



dorsal view

Size : Maximum mantle length 7 cm in females and 6 cm in males.

Interest to Fisheries : The annual catch fluctuated between 800 and 3 700 metric tons in the last few years, without any clear trend. The species is regularly taken with set nets in Toyama Bay, Japan, between February and early July (peak April to May). During this period it aggregates near the surface, particularly at night.



Local Names : JAPAN: Hotaruika, Matsuika.

Literature : Osako & Murata (in press, biology and fishery).

Remarks : Used also in research work on bioluminescence.

4.3 FAMILY OCTOPOTEUTHIDAE Berry, 1912

OCTO

Octopoteuthidae Berry, 1912, Proc.Acad.Nat.Sci.Phila., 64(2):432.

FAO Names : En - Octopus squids
Fr - Encornets poulpes
Sp - Pulpotas

General Remarks on the Family : The family comprises only two genera, Octopoteuthis (not included in this catalogue) and Taningia. It is characterized by biserial hooks on the arms (usually replaced by small biserial suckers near the arm tips); a lack of tentacles (in adults), buccal connectives that attach to the ventral borders of arms IV; a simple, straight, slightly broad funnel locking-cartilage; very large fins; light organs at the tips of at least some of the arms. Tentacles are present in larval forms of all species but are lost very early in development in Octopoteuthis, while they remain for some time in Taningia as small rudimentary filaments that bear a few distal club suckers; they eventually drop off in the juvenile stage.

Key to Genera :

1a. Several small, spindle-shaped photophores at tips of all eight arms .... **Octopoteuthis**

1b. Only one, very large photophore at tip of each arm II .... **Taningia**

Taningia danae Joubin, 1931

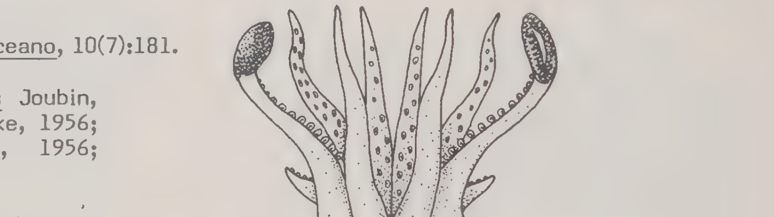
OCTO Tanin 1

Taningia danae Joubin, 1931, Ann.Inst.Oceano, 10(7):181.

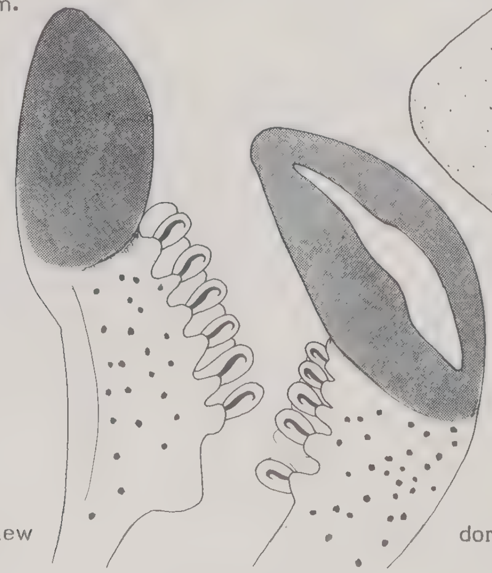
Synonymy : Cucioteuthis unguiculatus Joubin, 1898, 1900; Cucioteuthis unguiculatus Clarke, 1956; Cucioteuthis unguiculata Rees & Maul, 1956; Cucioteuthis unguiculata Clarke, 1962.

FAO Names : En - Dana octopus squid
Fr - Encornet poulpe dana
Sp - Pulpota

Diagnostic Features : Mantle broad, robust. Fins very large and thick, their length about 85% of mantle length, width 130% of mantle length. Tentacles lacking in adults. Arms with 2 rows strong hooks; arms II each with a large, distinct, black photophore at tip, its luminescent surface covered by an eyelid-type mechanism.



dorsal view



ventral view

dorsal view

arms II photophores

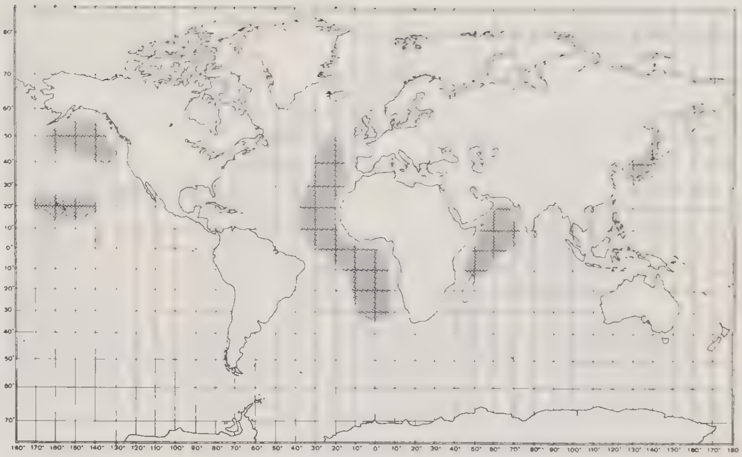
Geographical Distribution : Complete distributional range unknown; reported from western Japan, the northeastern Pacific; southern and central east Atlantic up to about 45°N; Hawaii; and western Indian Ocean.

Habitat and Biology : A primarily oceanic midwater species, believed to spawn on the bottom. It is heavily preyed upon by sperm whales.

Size : Maximum mantle length 1.4 m.

Interest to Fisheries : This species is believed to have some fishery potential.

Local Names :



4.4 FAMILY ONYCHOTEUTHIDAE Gray, 1849

ONYCHO

Onychoteuthidae Gray, 1849, Cat.Moll.Brit.Mus., 206.

FAO Names : En - Hooked squids
Fr - Cornets
Sp - Lurias, Luriones

General Remarks on the Family : Six genera currently are recognized: Onychoteuthis, Onykia, Moroteuthis, Ancistroteuthis, Chaunoteuthis, and Kondakovia. The generic boundaries, however, are not well defined and the family is in need of revision.

Onychoteuthis, the most widely distributed genus, is cosmopolitan and the only genus of the onychoteuthids presently known to possess photophores. The genus Onykia contains the smallest forms in the family and has a number of poorly defined species in tropical seas. The genus Moroteuthis includes the giants of the family; the largest recorded specimen had a total length greater than 4 m (Verrill, 1876). Chaunoteuthis differs from the other genera by having a gelatinous consistency. Kondakovia is an Antarctic form about which so little is known that it is not considered further here.

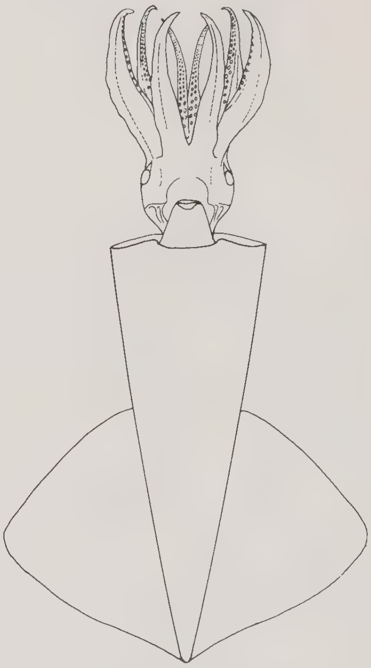
Diagnostic Features : Body muscular, tail pointed. Fins with sharp lateral angles; buccal connectives attached to ventral borders of ventral arms (IV); funnel-locking apparatus simple, straight; tentacular clubs with 2 rows of hooks and 2 marginal rows of suckers, or suckers absent; 8 arms and 2 contractile tentacles around mouth; 2 rows of suckers on arms. Colour: maroon to brick red, darker dorsally.

Interest to Fisheries : From the five genera in this family, several species are currently commercially exploited or have good potential for fisheries. A potential increase in fisheries for this group certainly exists (Okutani, 1977).

Key to Genera :

1 a. Mantle soft, semi-gelatinous; tentacles absent (Fig. 1) .... **Chaunoteuthis**

1 b. Mantle firm, muscular; tentacles present



Chaunoteuthis
ventral view Fig. 1

2 a. Nuchal folds present (Fig. 2a)

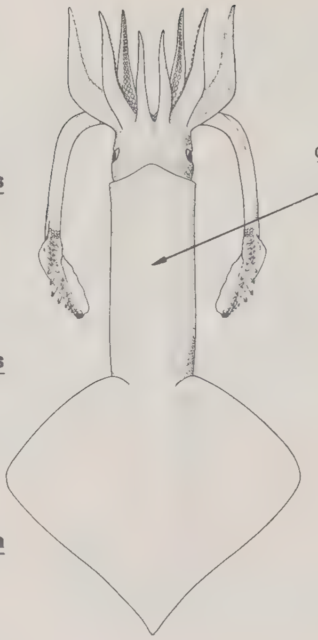
3 a. Rachis of gladius with a strong ridge visible along entire length of dorsal midline; 2 round light organs along ventral midline of intestinal tract (Fig. 3) .... **Onychoteuthis**

3 b. Rachis of gladius not strongly keeled, not visible along dorsal midline in subadults, but visible anteriorly in adults; light organs absent from intestinal tract (Fig. 4) .... **Ancistroteuthis**

2 b. Nuchal folds absent (Fig.2b)

4 a. Manus of tentacular club with 2 median rows of hooks and 2 lateral half rows of small suckers (Fig. 5a) .... **Onykia**

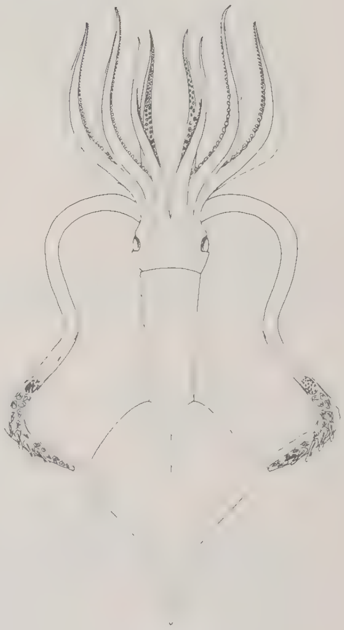
4 b. Manus of tentacular club with 2 median rows of hooks, but no marginal rows of suckers or hooks (Fig. 5b) .. **Moroteuthis**


rachis of gladius visible as a longitudinal ridge

Onychoteuthis

dorsal view

Fig. 2



Ancistroteuthis

dorsal view

Fig. 3

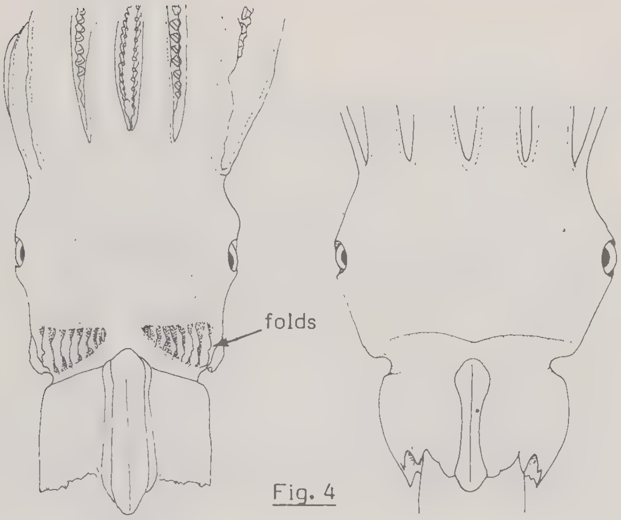


Fig. 4

a. Onychoteuthis

b. Onykia

dorsal view of head

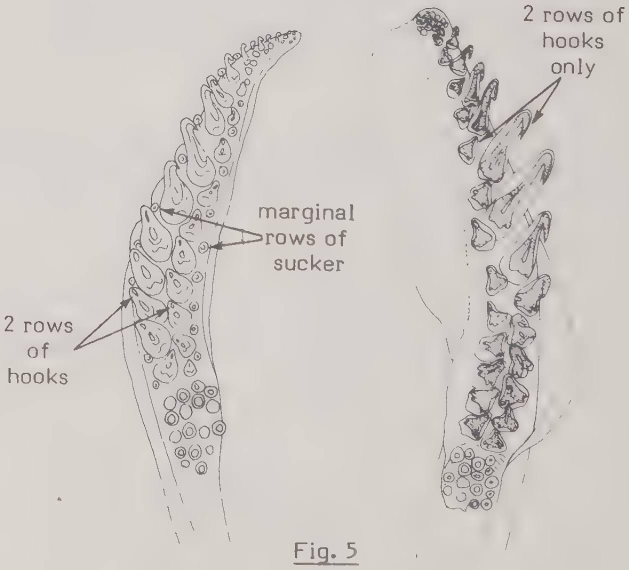

2 rows of hooks only
marginal rows of sucker
2 rows of hooks

Fig. 5

a. Onykia

b. Onychoteuthis

tentacular club

Ancistroteuthis lichtensteini (Orbigny, 1839)

ONYCHO Anc 1

Onychoteuthis lichtensteini Orbigny, 1839, in 1834-1848, Hist.Nat.Ceph.Acet.Viv.Foss., Atlas, Onychoteuthis, pl. 11 and 14.

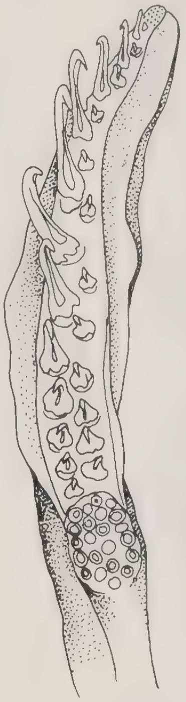
Synonymy : Onychoteuthis lichtensteini Orbigny, 1839.

FAO Names :
En - Angel squid
Fr - Cornet archange
Sp - Luria paloma

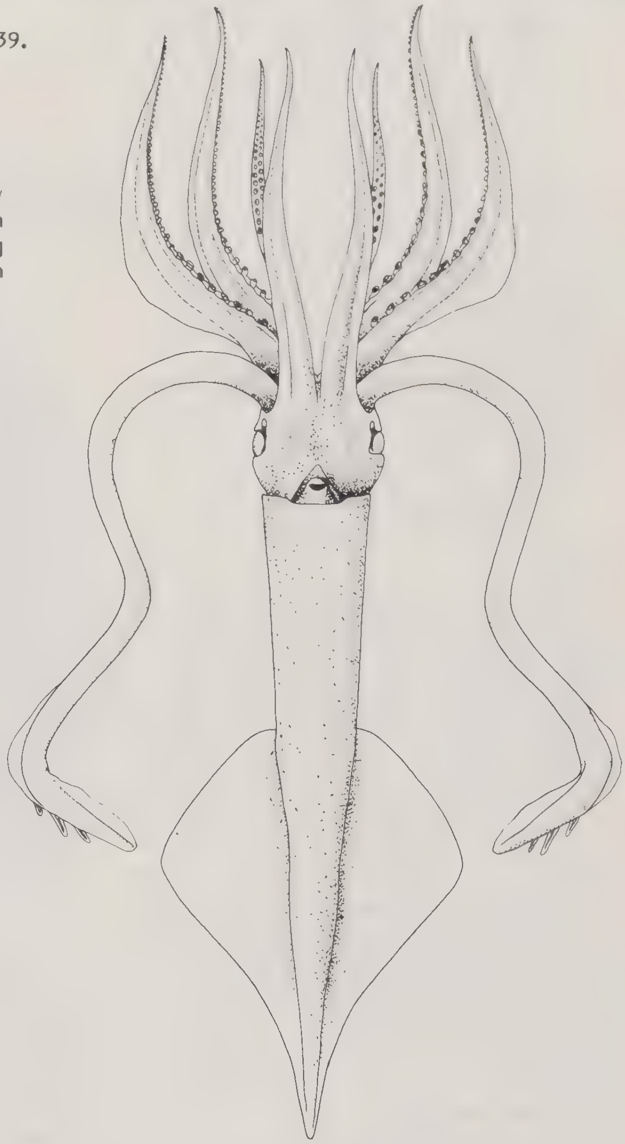
Diagnostic Features : Mantle slender, very muscular. Fins strong, lanceolate. Tentacular clubs in adults with 2 median rows of hooks (28), but lacking lateral rows of suckers; carpal pad of club elliptical with 8 to 12 suckers and 8 to 12 pads; 2 flap-like folds in neck area. Rhachis of gladius not visible along dorsal midline of mantle in subadults, visible anteriorly in adults. Light organs lacking on intestinal tract.

Geographical Distribution : Poorly known. Eastern Atlantic: From the Straits of Gibraltar to Angola, in the Mediterranean Sea; Gulf of Mexico; Melanesia. Distribution appears very disjunct because so few specimens have been reported in the scientific literature.

Habitat and Biology : A pelagic species occurring in open warm-temperate waters from the surface to about 250 m depth. In the western Mediterranean it is associated with gravel bottoms during spring and summer. Spawning occurs in the summer. It feeds on epipelagic and upper mesopelagic finfishes and crustaceans, and is in turn preyed upon by marine mammals and pelagic fishes.



tentacular club



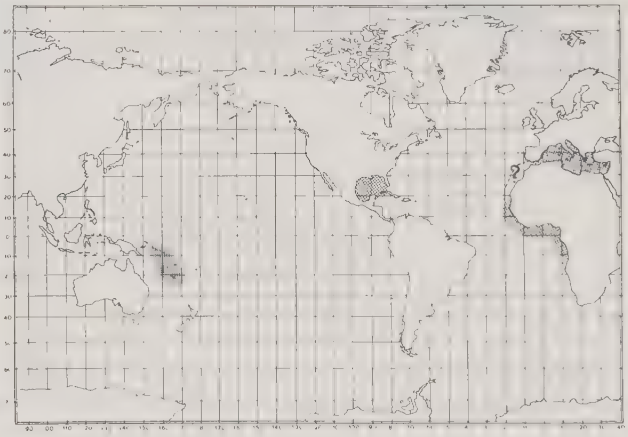
ventral view

Size : Maximum mantle length 30 cm.

Interest to Fisheries : Currently, no directed fishery exists for this species, it is only taken as bycatch in pelagic trawls. However, size and firm consistency of the flesh make it a potential target for a fishery.

Local Names :

Literature : Okutani (1980).



Onychoteuthis banksi (Leach, 1817)

ONYCHO Ony 1

Loligo banksi Leach, 1817, Zool.Misc., 3(30):141.

Synonymy : Loligo banksi Leach, 1817.

FAO Names : En - Common clubhook squid
Fr - Cornet crochu
Sp - Luria ganchuda

Diagnostic Features : Mantle very robust, muscular; several (9 or 10) elongate, flap-like folds around the dorso-lateral surface of the neck; a large, patch-like photophore on ventral surface of each eye. Fins muscular, with sharp lateral angles, tail pointed, length of fins about 50 to 60% of mantle length. Tentacular clubs with 19 to 23 large, claw-like hooks in 2 rows, no marginal rows of suckers. Gladius visible as a dark line through the skin along midline of mantle. Two large, round, bulbous light organs along ventral midline on intestinal tract.

Geographical Distribution : Worldwide in warm and temperate oceanic waters.

Habitat and Biology : An oceanic species occurring from the surface to 150 m depth, but may be found as deep as 800 m; its biology is unknown; high respiration rates suggest it is fast-growing; larvae are abundant in the eastern Atlantic, paricularly from January to March.

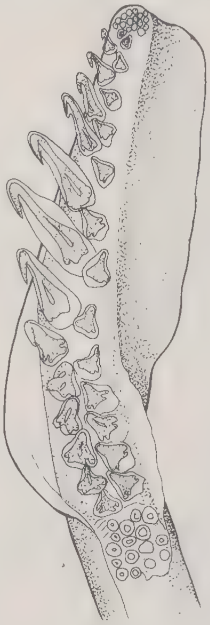
Size : Maximum mantle length 30 cm.

Interest to Fisheries : Currently there are no fisheries directed at this species, but it is frequently dip netted at night. The quality of the flesh as human food is judged to be good; it is occasionally dried and sold for human consumption.

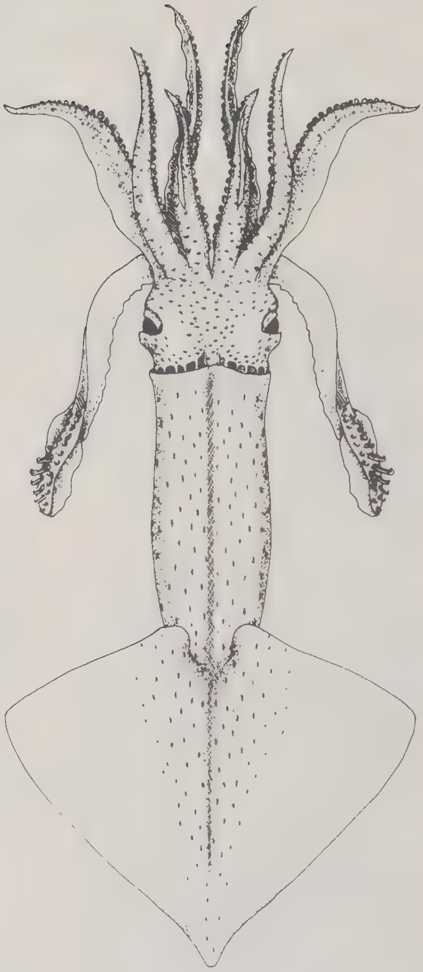
Local Names :

Literature : Abolmasova (1978, respiratory rates).

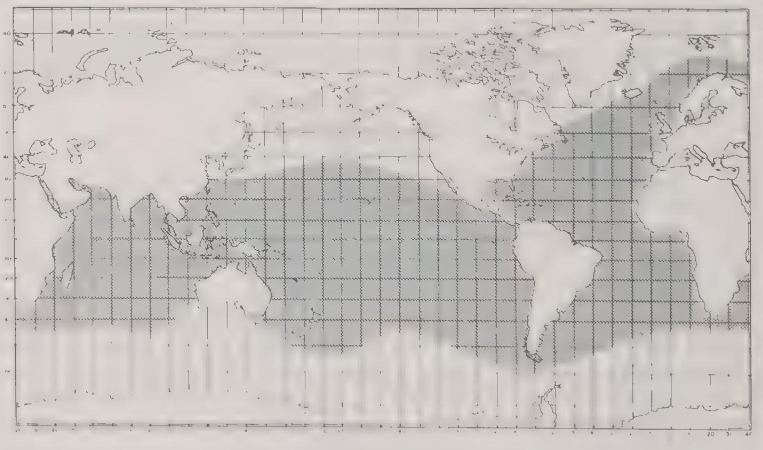
Remarks : The bite of this squid may be toxic and resembles a wasp sting in its effect.



tentacular club



dorsal view



Onychoteuthis borealijaponica Okada, 1927

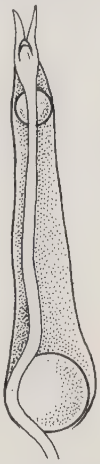
ONYCHO Ony 2

Onychoteuthis borealijaponicus Okada, 1927, Bull.Inst.Oceano, 494:7.

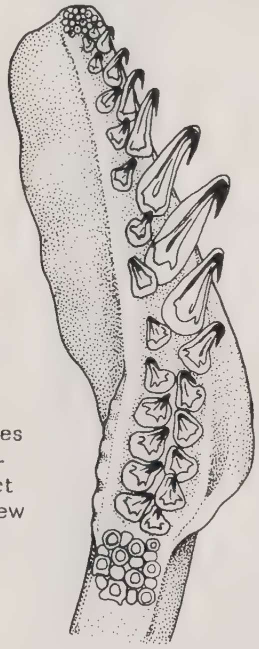
Synonymy : Onychoteuthis banksi Okada, 1927.

FAO Names :
En - Boreal clubhook squid
Fr - Cornet boréal
Sp - Luria boreal

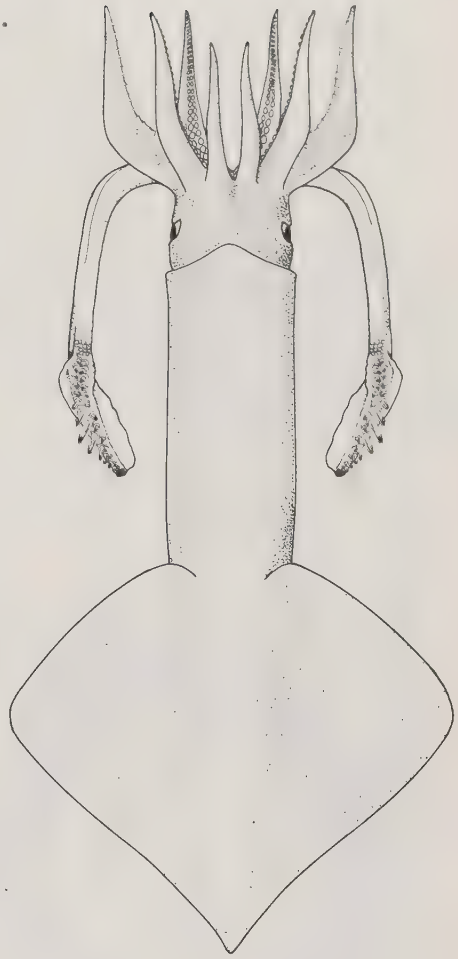
Diagnostic Features : Mantle long, slender, muscular (less robust than O. banksi). Fins broad, strong, muscular, their length 55 to 60% of mantle length. A large number of hooks on tentacular clubs (25 to 27). Small, oval photophores on intestinal tract.



photophores on intestinal tract ventral view



tentacular club



dorsal view

Geographical Distribution : North Pacific: Japan to USA (replaces Onychoteuthis banksi in colder, northern Pacific waters).

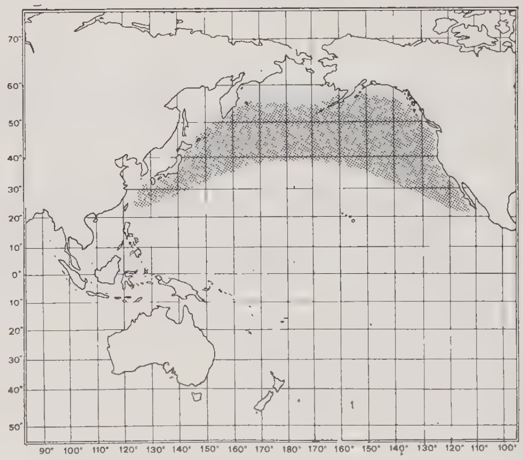
Habitat and Biology : An oceanic, pelagic species occurring from the surface down to undetermined depths, most abundant in the northwestern Pacific in surface waters of 9 to 13°C. East of Hokkaido, Japan, adults concentrate along the 10°C isotherm.

The population around the Japanese Islands appears to carry out north-south migrations. Juveniles are exclusively encountered in the warm-water area off southwestern Japan (Kuroshio and the countercurrent area), while adults are exploited in the cold-water zones off Hokkaido, further north. In June they arrive on these fishing grounds and remain there until fall. They migrate back southwards, and spawn in medium depths from late autumn through the winter southwest of Japan.

The species preys on small fishes; cannibalism is common.

Size : Maximum mantle length 37 cm in females, 30 cm in males; maximum weight 1.1 kg.

Interest to Fisheries : Following the decline of the yields of Todarodes pacificus this species is being increasingly fished commercially off northwestern Honshu, eastern Hokkaido, and in the northwestern USA, off Washington. It is primarily taken with jigs and drift gillnets. Jigging is particularly successful at night. The photophores make it appear as a dark shadow irradiating pale blue light near the surface. Sometimes it jumps aboard the vessel at night. It has been suggested that it might support commercial fishing operations in the northwestern Pacific north of the subarctic boundary, particularly during late summer and autumn.



Local Names : JAPAN: Tsumeika.

Literature : Murata & Ishi (1977, biology, northwest Pacific); Roberts (1978, resources of New Zealand); Tomiyama & Hibiya (1978); Okutani (1980); Fiscus & Mercer (1982, North Pacific bycatch in surface gillnets); Okutani & Murata (in press); Osako & Murata (in press, fishery).

Moroteuthis ingens (Smith, 1881)

ONYCHO Moro 1

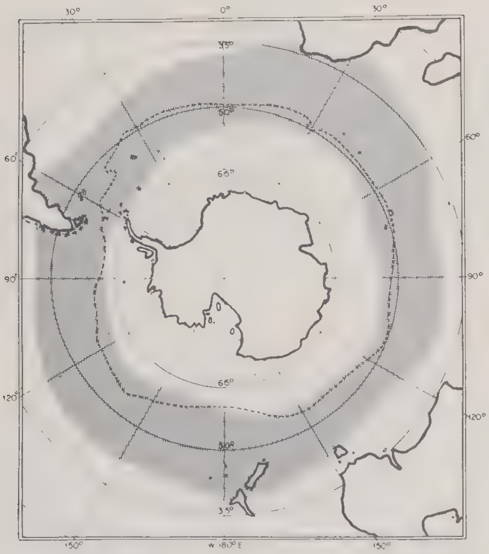
Onychoteuthis ingens Smith, 1881, Proc.Zool.Soc.Lond., 1881:25.

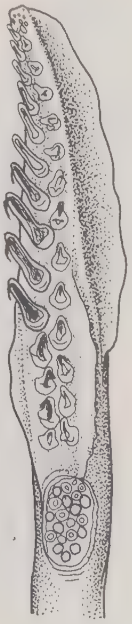
Synonymy : Onychoteuthis ingens Smith, 1881.

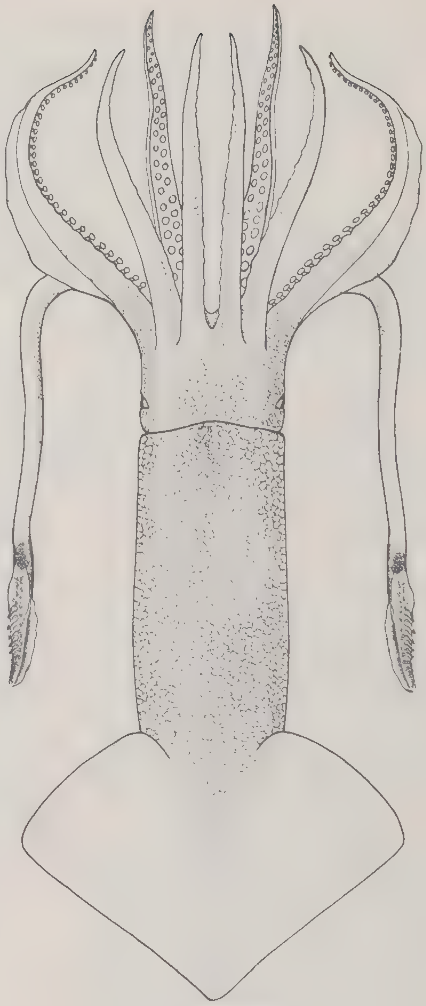
FAO Names :
En - Greater hooked squid
Fr - Cornet commun
Sp - Lurión común

Diagnostic Features : Mantle robust, broad, thick, heavily muscled, not drawn out into a sharp tail, covered with fleshy warts. Fins large, broad, with broad angles of 50 to 55% each, length about 45% of mantle length. Tentacular clubs unexpanded, with 28 hooks in 2 rows. Longest arms (II and III) about 70% of mantle length.

Geographical Distribution : In subantarctic waters north of the convergence.




tentacular club


dorsal view

Habitat and Biology : An oceanic epipelagic species; probably occurring in less than 200 m, but the exact depth range is unknown. Its biology is barely known. It is a major item in the diet of sperm whales and also preyed upon by seals.

Size : Maximum mantle length 94 cm.

Interest to Fisheries : Abundant species in subantarctic waters and believed to have some fishery potential.

Local Names :

Moroteuthis knipovitchi Filippova, 1972

ONYCHO Moro 2

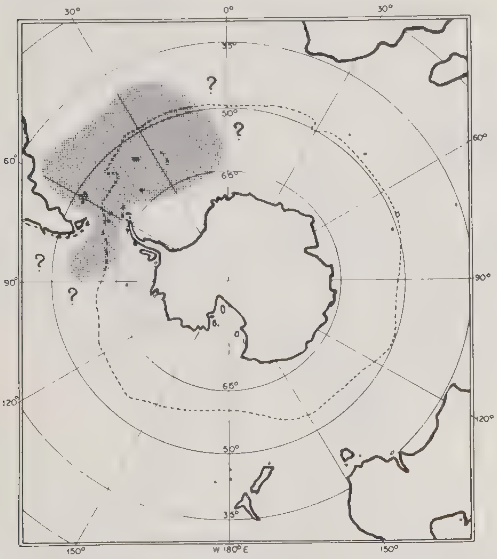
Moroteuthis knipovitchi Filippova, 1972, Malacologia, 11(2):392.

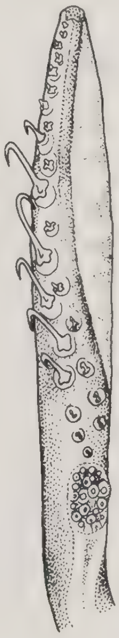
Synonymy : None.

FAO Names :
En - Smooth hooked squid
Fr - Cornet lisse
Sp - Lurión liso

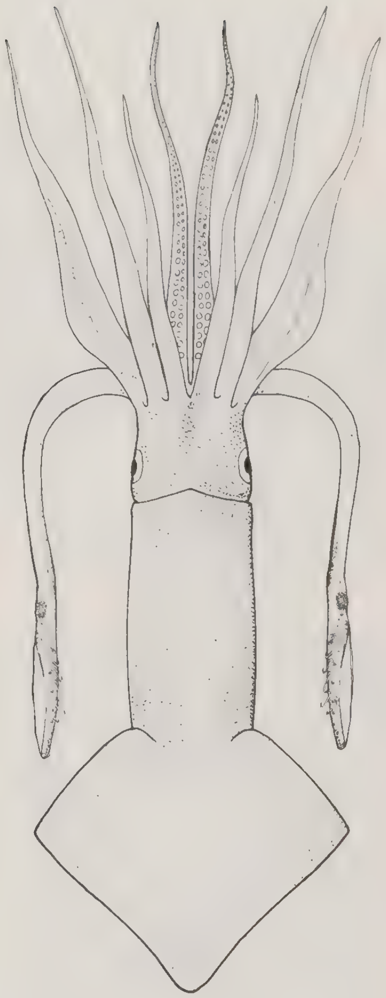
Diagnostic Features : Mantle moderately broad, stout, smooth-textured surface, not drawn out into prominent tail. Fins broad, fin angles 45 to 50° each, their length about 50% of mantle length. Tentacular clubs with 20 to 30 hooks in 2 rows, the 2nd to 4th on the dorsal row and 6th to 8th on ventral row the largest. Longest arms (II) 90% of mantle length.

Geographical Distribution : Scotia Sea and Argentine Basin ranging into the Southern Ocean and through Drake Passage to the West; possibly circumpolar.





tentacular club



dorsal view

Habitat and Biology : An oceanic species; one of the most heavily preyed upon by sperm whales in the Southern Ocean.

Size : Maximum mantle length 35 cm.

Interest to Fisheries : Its size and consistency make it a potential target for a fishery.

Local Names :

Literature : Okutani (1980).

Moroteuthis lönnbergi Ishikawa & Wakiya, 1914

ONYCHO Moro 3

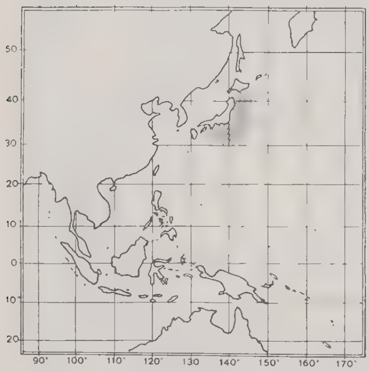
Moroteuthis lönnbergii Ishikawa & Wakiya, 1914, *Jour.Coll.Agric., Imper.Univ.Tokyo*, 4(7):445.

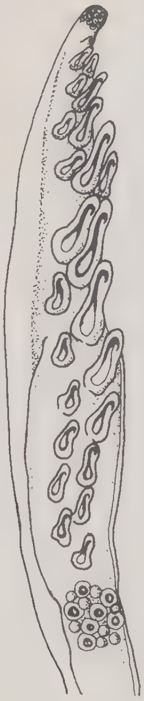
Synonymy : None.

FAO Names : En - Japanese hooked squid
Fr - Cornet japonais
Sp - Lurión japonés

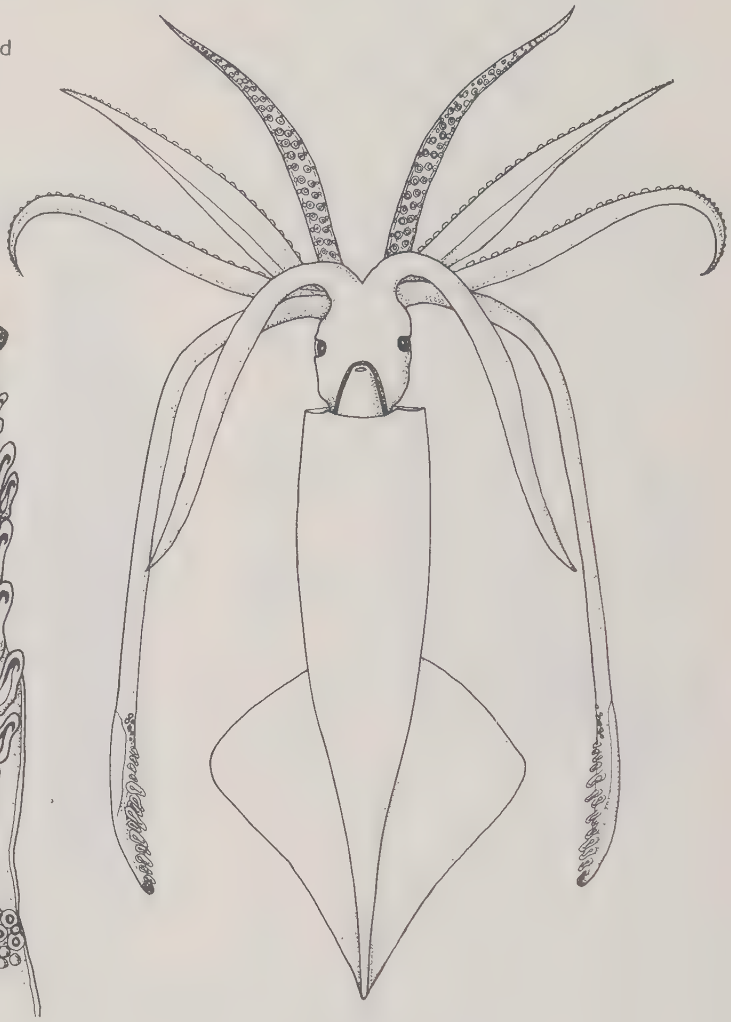
Diagnostic Features : Mantle robust, muscular, covered with fleshy ridges or warts, tip drawn out to a moderately lengthened, pointed tail. Fins broad, powerful, their width about 67% of mantle length, length about 55% of mantle length; fin angles about 35° to 40° each. Tentacular clubs long, unexpanded, with about 25 hooks in 2 rows. Longest arms (IV) 60% of mantle length.

Geographical Distribution : Western Pacific: off eastern Japan.





tentacular club



dorsal view

Habitat and Biology : An oceanic species from temperate waters. Its exact depth distribution is unknown, but it has been caught in open nets in depths between 730 and 920 m; however, it is believed that it also occurs in depths less than 200 m, because it is preyed upon by fur seals as well as sperm whales.

Size : Maximum mantle length 30 cm.

Interest to Fisheries : Undetermined.

Local Names :

Literature : Okutani (1980).

Moroteuthis robsoni Adam, 1962

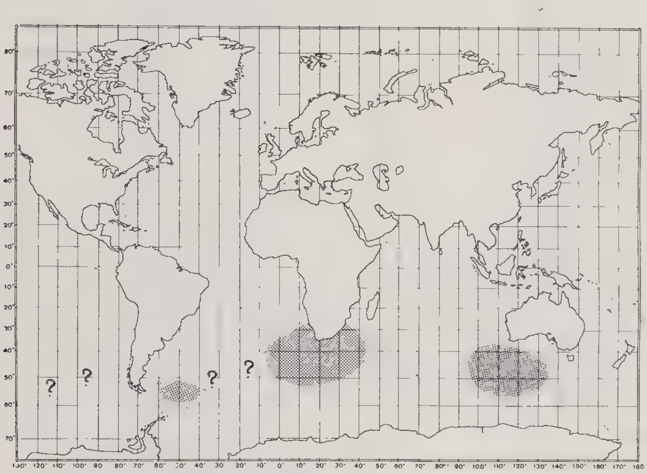
Moroteuthis robsoni Adam, 1962, *Mem.Junta Invest.Ultramar*, (2)33:24.

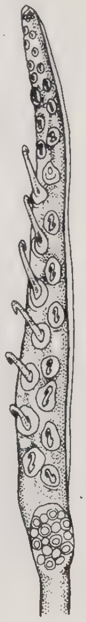
Synonymy : None.

FAO Names : En - Rugose hooked squid
Fr - Cornet rugueux
Sp - Lurión rugoso

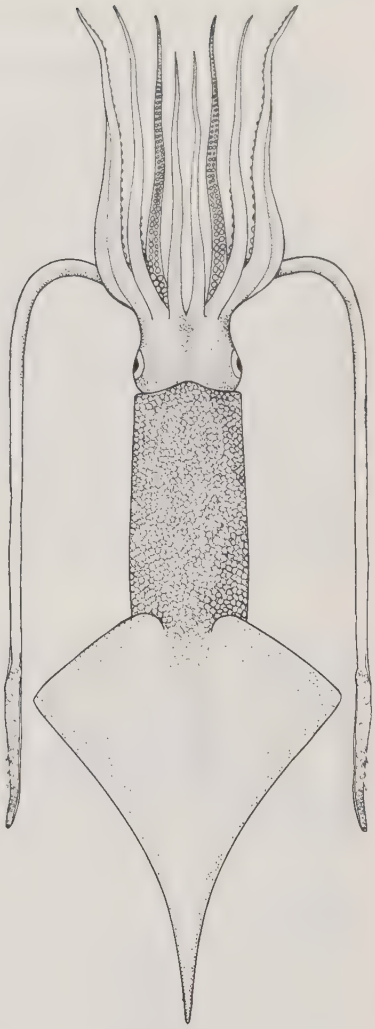
Diagnostic Features : Mantle long, slender, covered with fleshy warts, reddish coloration, tip drawn out to a long, sharp tail. Fins relatively narrow, 45% of mantle length, their length 58 to 60% of mantle length, forming a very sharply pointed lanceolate tail, fin angle 30^0 to 40^0 each. Tentacular clubs very narrow, unexpanded, about 24 hooks in 2 rows. Arms attenuate, longest (IV) about 57 to 68% of mantle length.

Geographical Distribution : Scotia Sea; southern tip of Africa; off southwestern Australia. Apparently not known from central subantarctic oceanic waters away from land masses.





tentacular club



dorsal view

Habitat and Biology : An oceanic species, taken with open nets lowered to between 250 and 550 m depth; its exact depth distribution is unknown. One of the squid species heavily preyed upon by sperm whales.

Size : Maximum mantle length 75 cm.

Interest to Fisheries : Caught by bottom trawls; believed to have some fishery potential.

Local Names :

Literature : Okutani (1980).

Moroteuthis robustus (Verrill, 1876)

ONYCHO Moro 5

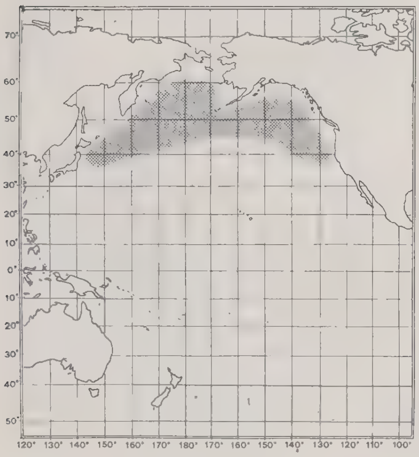
Ommastrephes robusta Verrill, 1876, *Amer.Jour.Sci.Arts*, 12:237.

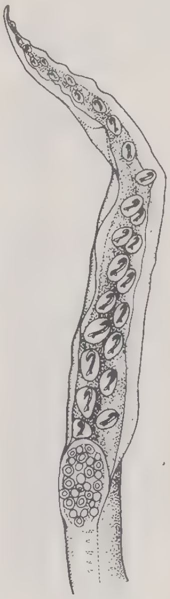
Synonymy : *Ommastrephes robusta* Verrill, 1876; *Lestoteuthis robusta* Verrill, 1880; *Ancistroteuthis robusta* Steenstrup, 1882.

FAO Names :
En - Robust clubhook squid
Fr - Cornet mange-piquants
Sp - Lurion maximo

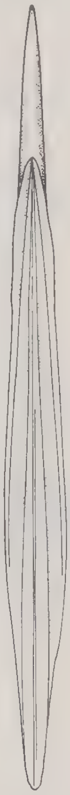
Diagnostic Features : Mantle robust, relatively broad, covered with raised fleshy longitudinal ridges, posterior tip drawn out to a moderately pointed tail. Fins large, longer than broad, their length about 50% of mantle length, width about 45% of mantle length. Tentacular clubs narrow, each with 36 hooks in 2 rows. Longest arms (IV) 45 to 50% of mantle length.

Geographical Distribution : Eastern and western far North Pacific in offshore waters from Japan to Alaska, throughout Aleutian Islands and into the Bering Sea.

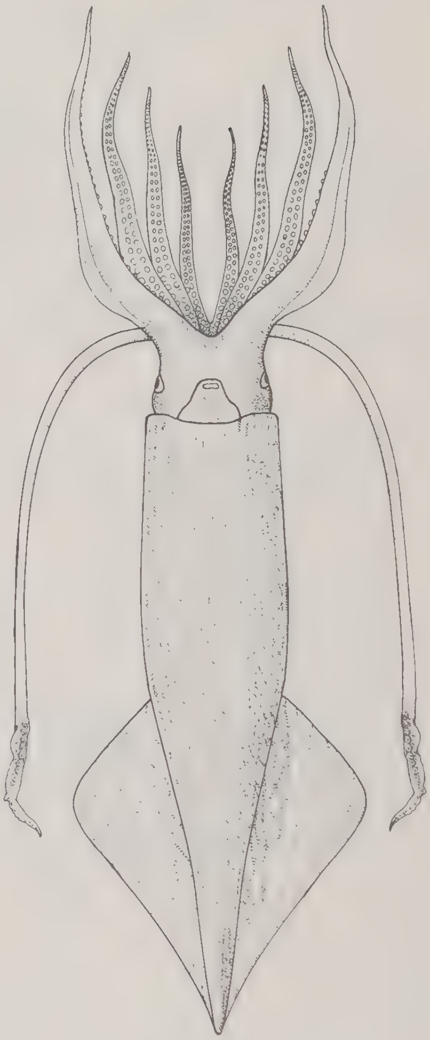




tentacular club



gladius
ventral view



ventral view

Habitat and Biology : An oceanic species, heavily preyed upon by sperm whales; reported to feed on benthic heart urchins such as *Brisaster townsendi*, as well as on epipelagic species such as *Velella velella*.

Size : Maximum mantle length 2 m, weight to 50 kg.

Interest to Fisheries : Believed to have some fishery potential, even though attempts to prepare them for food in California have failed.

Local Names :

Literature : Okutani (1980).

4.5 FAMILY GONATIDAE Hoyle, 1886

GONA

Gonatidae Hoyle, 1886, Rep.Sci.Results CHALLENGER, 16(44):173.

FAO Names : En - Gonate squids
Fr - Encornets
Sp - Gonaluras

General Remarks on the Family : Species in this family belong to 3 genera, *Berryteuthis*, *Gonatopsis* and *Gonatus*. They are cold water forms and are among the most abundant squids in higher latitudes.

Diagnostic Features : This family is characterized by a tetraserial armature on the arms. Arm tips, however, in one species, *Gonatopsis octopedatus*, are modified and have up to 12 rows of minute suckers. The two medial rows on arms I to III consist of hooks in all species, except *Berryteuthis anonychus* which has only suckers, except at the bases of some arms in females. All members of the family have a simple straight funnel locking-cartilage which may flare slightly at the posterior end; buccal connectives that attach to the ventral borders of arms IV; numerous irregular rows of suckers on the clubs with additional hooks in some forms (i.e., *Gonatus* species). Only one species in the family has photophores (*Gonatus*, new species): oval patches located on the ventral surface of the eyes.

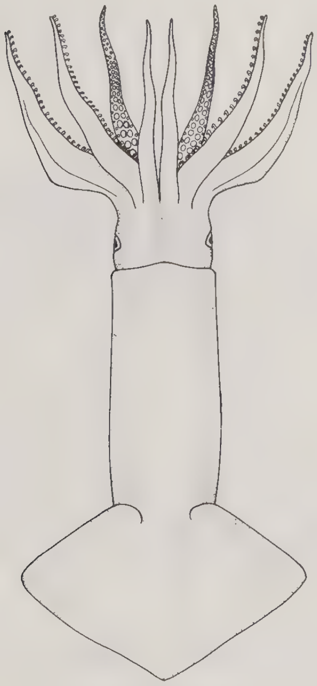
Key to Genera :

1a. Tentacles absent (except in the early larval forms) (Fig. 1) .... **Gonatopsis**

1b. Tentacles present at all life stages

2a. At least one large hook in the centre of the tentacular club; radula with 5 longitudinal rows of teeth (Fig. 2a) .... **Gonatus**

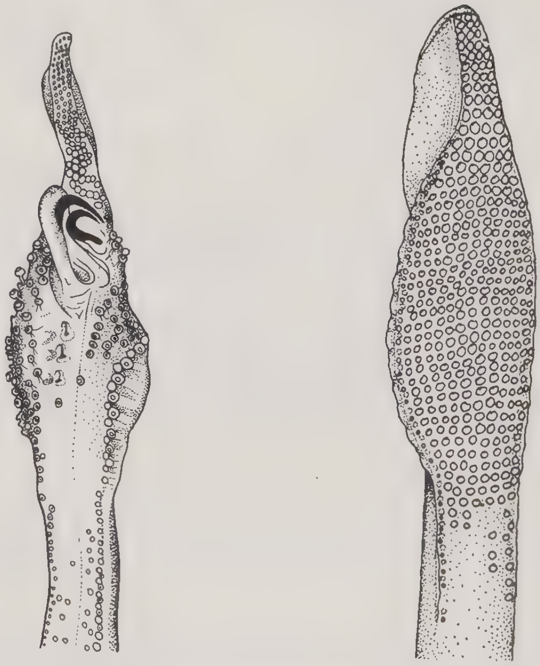
2b. No hooks on the tentacular club; radula with 7 longitudinal rows of teeth (Fig. 2b) .... **Berryteuthis**



Gonatopsis

dorsal view

Fig. 1



a. *Gonatus*

b. *Berryteuthis*

tentacular club

Fig. 2

Gonatus fabricii (Lichtenstein, 1818)

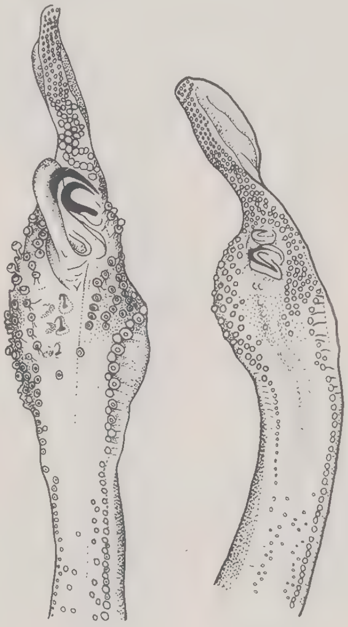
GONA Gonat 1

Onychoteuthis fabricii Lichtenstein, 1818, Abhand.Phys.Kl.Kon.-Preus.Akad.Wiss., 1819:223.

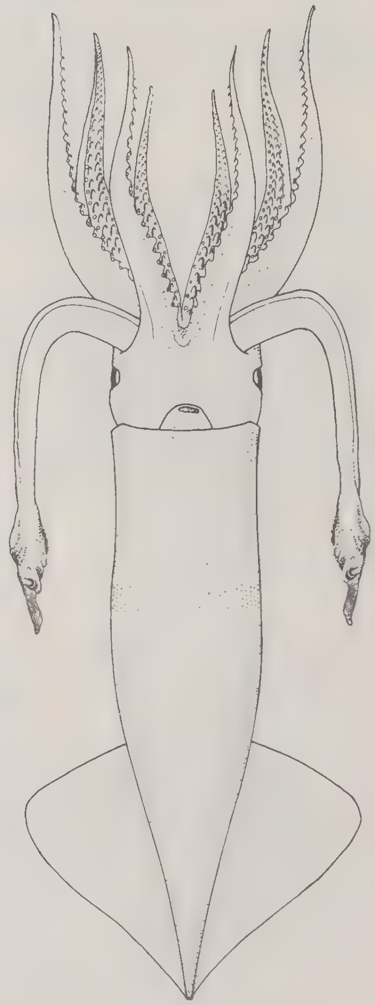
Synonymy : Onychoteuthis fabricii Lichtenstein, 1818.

FAO Names :
En - Boreoatlantic gonate squid
Fr - Encornet atlantoboréal
Sp - Gonalura atlantoboreal

Diagnostic Features : Mantle long, slender conical, slightly wider at midpoint, tapering to a sharp point posteriorly, its muscular part ending at conus, but a fleshy, tapered column extending posteriorly as the tail. Fins saggitate with anterior lobes free, lateral margins rounded, their length less than 50% of mantle length, their width slightly less than the length. Tentacular clubs small, their length about 10 to 20% of mantle length, with 1 very large, central hook followed proximally with 3 small hooks and 1 small sucker, and distally by 1 moderate-sized sucker.

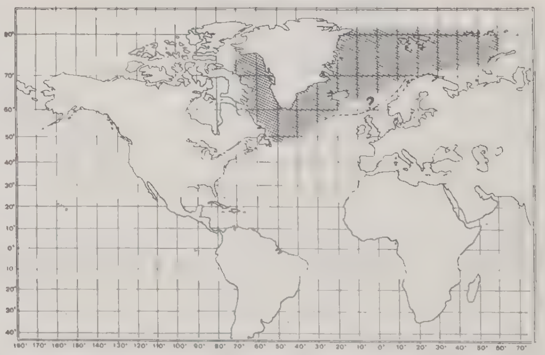

adult juvenile

tentacular club


ventral view

Geographical Distribution : Offshore arctic and subarctic waters of the northern North Atlantic from the Newfoundland Basin, around Greenland and eastward to the Barents Sea.

Habitat and Biology : An oceanic species occurring between the surface and 500 m depth. Adults are common in midwater layers in arctic and subarctic waters of the North Atlantic, while juveniles inhabit surface waters in the northwest Atlantic. Spawning seems to extend from mid-April to December with a peak period in late May and June. It is speculated that in the Norwegian Sea spawning occurs from winter to summer and hatching subsequently from late March to June or July. Juveniles feed on copepods, euphausids, amphipods, pteropods, and chaetognaths. Once the hooks have developed (at a mantle length of 2.5 cm), an important part of the diet is made up of fish; and adults can feed on prey larger than themselves. It is preyed upon by the bottlenose whale and hooded seals in the Norwegian Sea and by sperm whales off Iceland and in the North Atlantic. It is also frequently found in stomachs of other marine mammals, of coalfish, various gadoids, the redfish Sebastes marinus and others.



Size : Maximum mantle length 30 cm.

Interest to Fisheries : This species is believed to have some fishery potential. Greenland Eskimos use it as bait in the cod and shellfish (paltus) industry and for human food. Taken as bycatch in shrimp trawls.

Local Names :

Literature : Wiborg (1979, fishery potential Norwegian Sea, biological observations); Okutani (1980).

Gonatus madokai Kubodera & Okutani, 1977

GONA Gonat 2

Gonatus madokai Kubodera & Okutani, 1977, Venus, 36(3):124.

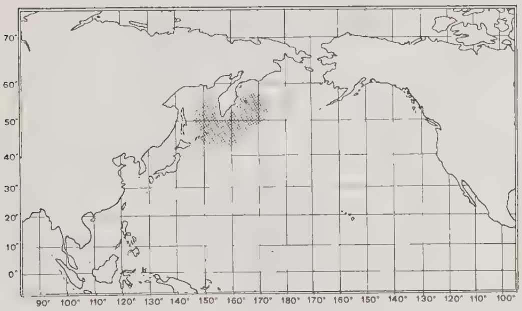
Synonymy : None.

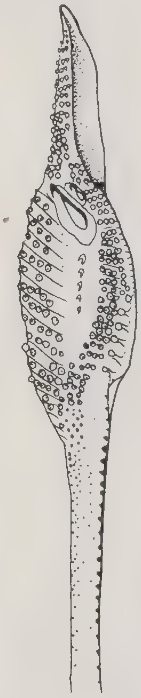
FAO Names :

En -	Madokai gonate squid
Fr -	Encornet madokai
Sp -	Gonalura madokai

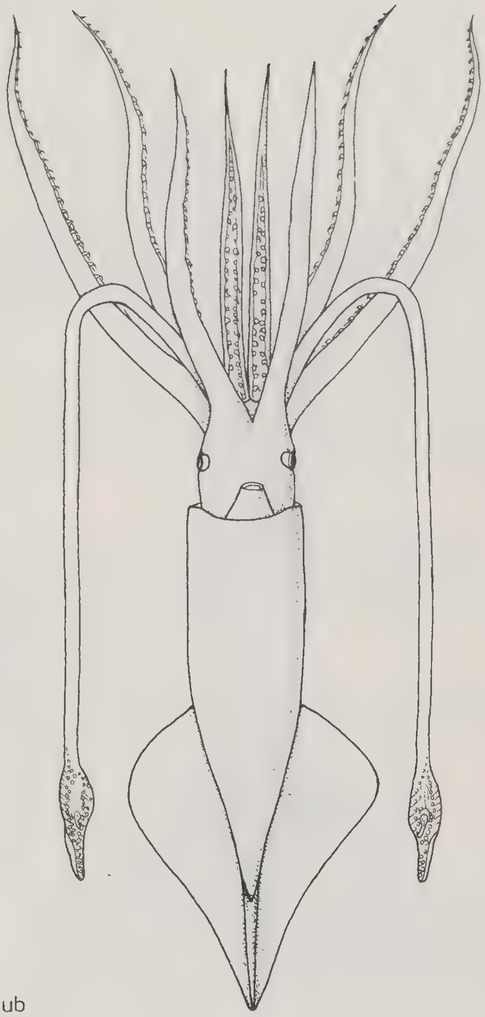
Diagnostic Features : Mantle moderately broad, soft-fleshed, extending posteriorly into a long, pointed tail, the posterior part non-muscular posterior to conus. Fins saggitate, their length 60 to 65% of mantle length, their width 50% of mantle length. Tentacular clubs with 1 very large central hook, 1 moderate-sized hook distally, and 5 very small hooks proximally. Arms very long, the longest (III) equal to mantle length.

Geographical Distribution : Northern northwest Pacific: around the Kamchatka peninsula and the Kurile and Aleutian islands; especially in the Okhotsk Sea.





tentacular club



ventral view

Habitat and Biology : An epipelagic species. The larvae are abundant in the Okhotsk Sea. Adults are heavily preyed upon by toothed whales.

Size : Maximum mantle length 33 cm.

Interest to Fisheries : Very abundant; believed to have potential for development of a fishery.

Local Names :

Literature : Okutani (1980).

Gonatus middendorffi Kubodera & Okutani, 1981

GONA Gonat 3

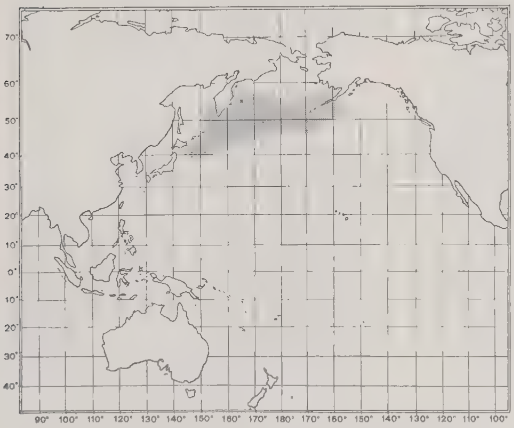
Gonatus middendorffi Kubodera & Okutani, 1981, *Bull.Natl.Sci.Mus.Tokyo*, 7(1):8.

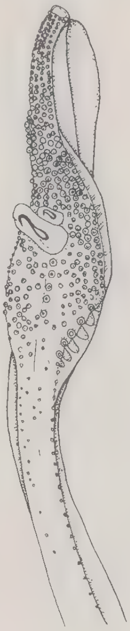
Synonymy : None.

FAO Names : En - Shortarm gonate squid
Fr - Encornet bras courts
Sp - Gonalura bracicorta

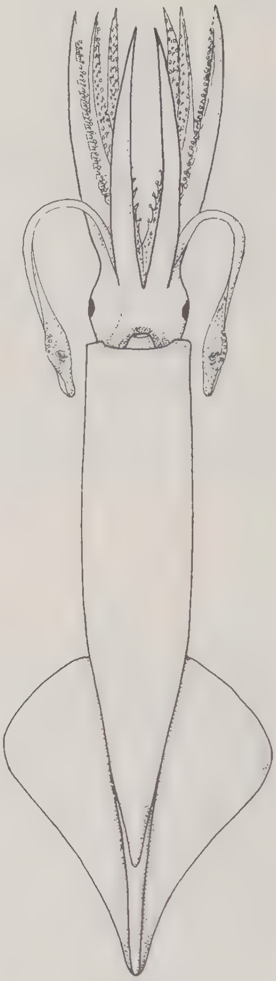
Diagnostic Features : Mantle long, muscular, very slender, its width 18% of mantle length, tapering posteriorly to a sharp, choroidal tail. Fins muscular, relatively long (47 to 52% of mantle length) and narrow (their width 40% of mantle length), sharply pointed; fin angle 25° (50° both fins). Tentacular stalks very small, weakly developed; tentacular clubs very small, their length less than 13% of mantle length; manus with a large central hook, a medium-sized distal hook and 5 small proximal suckers, 2 or 3 of which are sometimes modified into small, immature hooks.

Geographical Distribution : Far North Pacific Ocean, Bering Sea, along the Aleutian and Kurile islands chains.





tentacular club



ventral view

Habitat and Biology : An oceanic species; the larvae are encountered near the surface at night; it is an important food item in the diet of sperm whales and salmon (especially *Oncorhynchus nerka* and *O. kisutch*).

Size : Maximum mantle length 30 cm.

Interest to Fisheries : Believed to have a fisheries potential.

Local Names :

Gonatus steenstrupi Kristensen, 1981

GONA Gonat 4

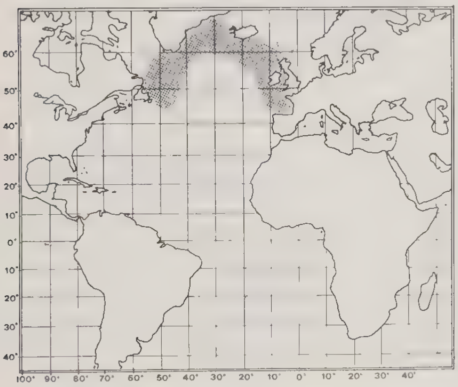
Gonatus steenstrupi Kristensen, 1981, Steenstrupia, 7(4):78.

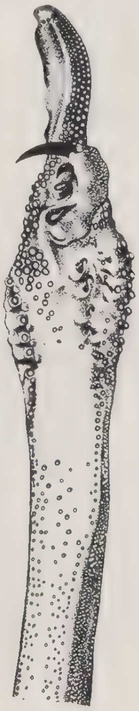
Synonymy : Gonatus fabricii Lichtenstein, 1818, in part.

FAO Names : En - Atlantic gonate squid
Fr - Encornet atlantique
Sp - Gonalura atlántica

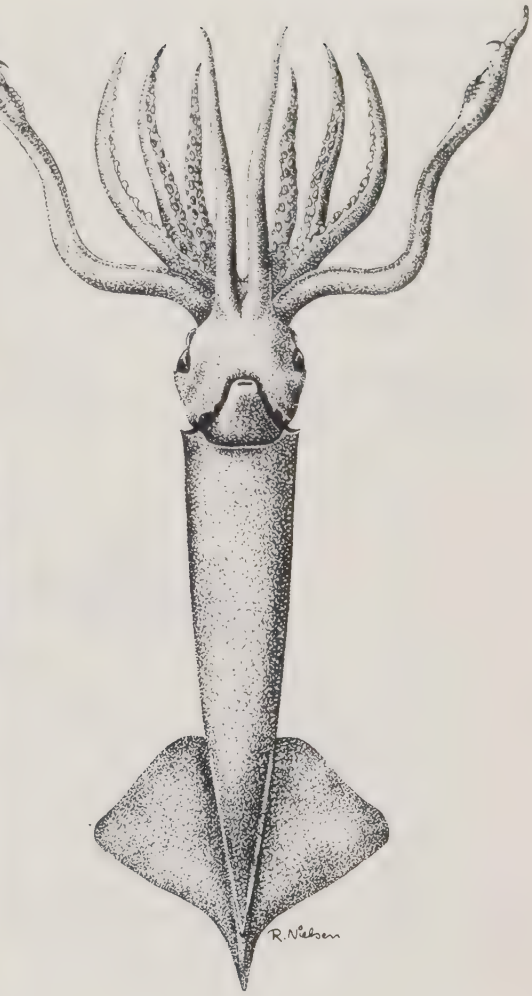
Diagnostic Features : Mantle long, very slender, thick-walled, tapering evenly to the posterior pointed tip (short tail), widest at anterior margin; muscular part of mantle ends at conus, but a fleshy column extends posteriorly as a tail. Fins saggitate, their length about 45% of mantle length, their width 52% of mantle length. Tentacular clubs large, expanded, their length about 25% of mantle length; 1 very large central hook with 1 moderate-sized hook just distal to it and 4 to 5 progressively smaller hooks proximal to it (5th hook sometimes a sucker).

Geographical Distribution : Widely distributed in the temperate (Bay of Biscay) to boreal (Irminger Sea-East Greenland) waters, North Atlantic and east of the Grand Banks of Newfoundland; not entering arctic waters.





tentacular club



ventral view

Habitat and Biology : Oceanic, occurring possibly to 1 000 m depth. It is an important food item in the diet of toothed whales.

Size : Maximum mantle length 15 cm.

Interest to Fisheries : Currently there are no fisheries directed at this species, but its large size and the consistency of its flesh make it a good potential resource.

Local Names :

Remarks : This species was confused with G. fabricii until it was recognized and separated by Kristensen in 1981. It is more boreal/high temperate in distribution, whereas G. fabricii is more arctic/subarctic.

Gonatopsis borealis Sasaki, 1923

GONA Gona 1

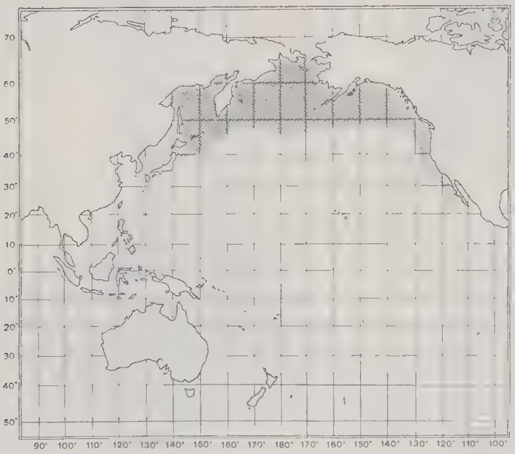
Gonatopsis borealis Sasaki, 1923, Annot.Zool.Japan, 10:202.

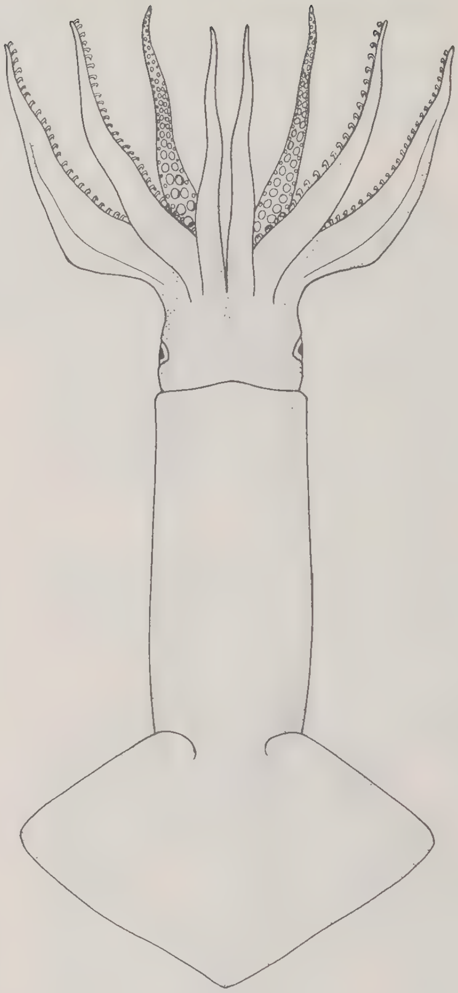
Synonymy : None.

FAO Names :
En - Boreopacific gonate squid
Fr - Encornet boréopacifique
Sp - Gonalura pacificoboreal

Diagnostic Features : Mantle stout, thick, muscular. Fins muscular, relatively short (40 to 45% of mantle length) and broad (65 to 70% of mantle length). Tentacles absent (present only in larvae). Arms robust, muscular, 40 to 50% of mantle length; arms I to III with medium rows of hooks and 2 marginal rows of suckers; arm IV with 4 rows of suckers, no hooks.

Geographical Distribution : Northern Pacific: Northern Japan through the Bering Sea, from the Aleutian Islands to California.





dorsal view

Habitat and Biology : An oceanic species in cold temperate waters, encountered in midwaters to about 700 m depth. It is known to undertake diel vertical migrations and to form increasingly large aggregations between April and early autumn, particularly in the eastern and western parts of the north Pacific. It is heavily preyed upon by sperm whales.

Size : Maximum mantle length 30 cm.

Interest to Fisheries : Incidentally taken with jigs and drift gillnets and believed to have some fishery potential because of its abundance.

Local Names : JAPAN: Takoika.

Literature : Okutani (1980); Tomiyama & Hibiya (1978); Nesis & Shevtsov (1977).

Remarks : A closely related species, Gonatopsis octopodatus, occurs in Japanese waters (northwestern Pacific) and it is distinguished by having 8 to 12 rows of minute suckers on the distal 1/3 to 1/4 of the arms.

Gonatopsis makko Okutani & Nemoto, 1964

Gonatopsis borealis makko Okutani & Nemoto, 1964, Sci.Rep.Whales Res.Inst., 18:113.

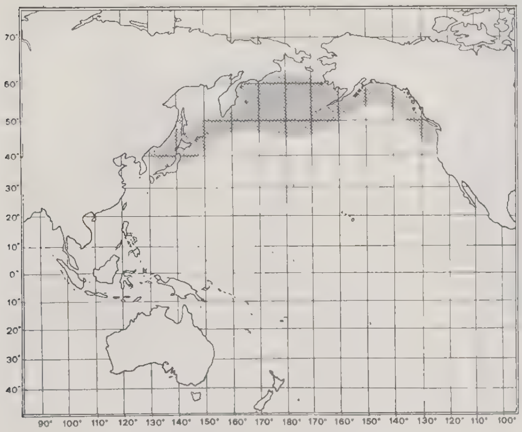
Synonymy : None.

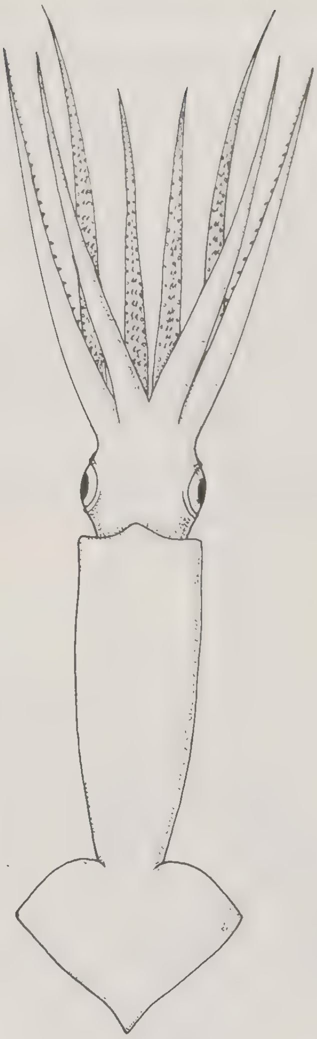
FAO Names :

En	- Mako gonate squid
Fr	- Encornet mako
Sp	- Gonalura mako

Diagnostic Features : Mantle long, slender. Fins very small, short (about 33% of mantle length), narrow (their width from 45 to 50% of mantle length). Tentacles absent in adults. Arms very long, attenuate, up to 80% of mantle length.

Geographical Distribution : North Pacific: From Japanese waters to the Bering Sea, but excluding the Sea of Okhotsk, eastwards to the northwestern coast of North America.





dorsal view

Habitat and Biology : An oceanic species; occurring rather frequently in midwater layers in the Japan Sea and the northern North Pacific; usually in lower temperatures than Todarodes pacificus and Ommastrephes bartrami. Two subpopulations are believed to exist showing different growth patterns. It is most abundant between May and July; occasionally preyed upon by sperm whales.

Size : Maximum mantle length 25 cm.

Interest to Fisheries : Taken as bycatch in the bottom trawl fisheries, but at present of no great commercial interest. Separate statistics are not reported for this species.

Local Names : JAPAN: Takoika.

Literature : Okutani (1980); Osako & Murata (in press, biology, distribution).

Remarks : Some authors consider G. makko a subspecies of G. borealis.

Berryteuthis anonychus (Pearcey & Voss, 1963)

GONA Berry 1

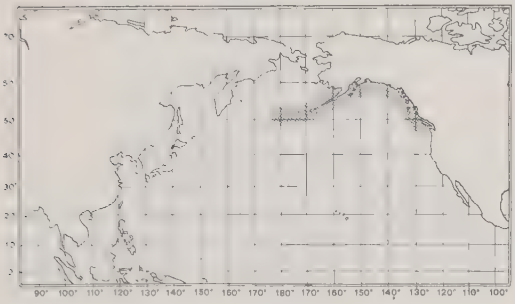
Gonatus anonychus Pearcey & Voss, 1963, Proc.Biol.Soc.Wash., 76:105.

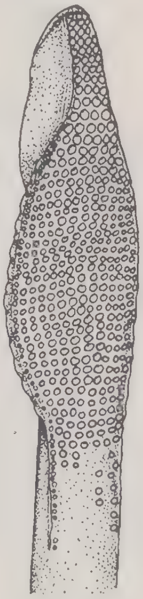
Synonymy : Gonatus anonychus Pearcey & Voss, 1963.

FAO Names : En - Smallfin gonate squid
Fr - Encornet ailes courtes
Sp - Gonalura alicorta

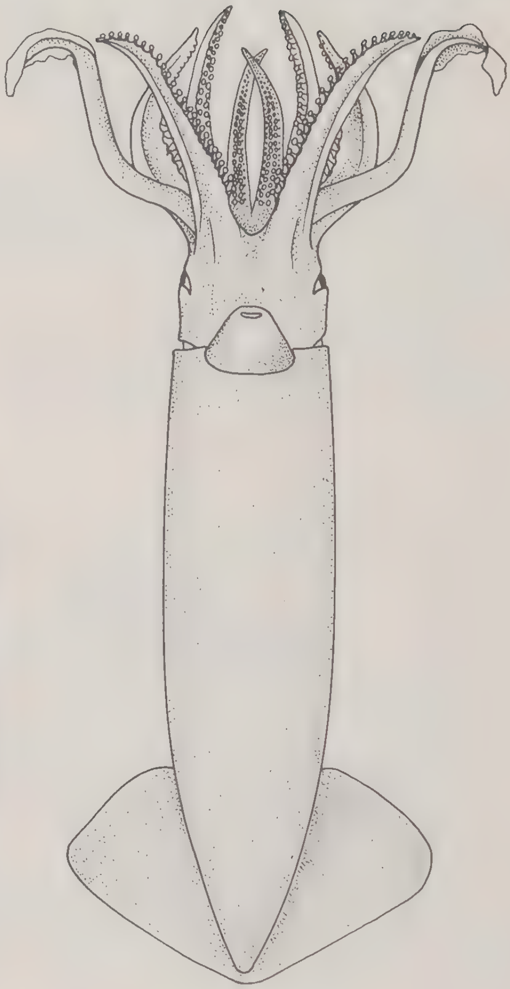
Diagnostic Features : Size small. Mantle muscular, elongate, narrow. Fins very small, short (25 to 30% of mantle length), narrow (width 45 to 50% of mantle length). Tentacular clubs long (about 1/2 of tentacle length), with numerous minute suckers numbering 12 to 15 in the transverse rows, no hooks. Arms with four rows of suckers and very few (about 6) small, weakly developed hooks in the medial 2 rows on the basal part of arms I to III in females, the rest suckers; no hooks in males.

Geographical Distribution : Northeastern Pacific: Oregon to the Aleutian Islands; no records from the Bering Sea.





tentacular club



ventral view

Habitat and Biology : An oceanic species occurring from surface (at night) to about 1 500 m depth in offshore waters. The exact distribution pattern is unknown. Mature specimens have a mantle length of 6 cm (females) and 7 cm (males) respectively.

Size : Maximum mantle length 15 cm.

Interest to Fisheries : Undetermined.

Local Names :

Literature : Okutani (1980).

Berryteuthis magister (Berry, 1913)

GONA Berry 2

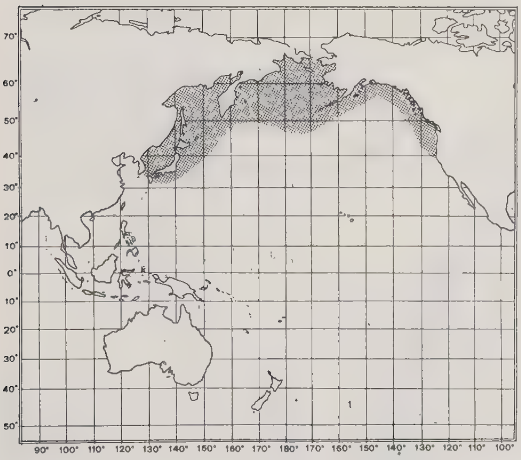
Gonatus magister Berry, 1913, Prov.Acad.Nat.Sci.Phila., 1913:76.

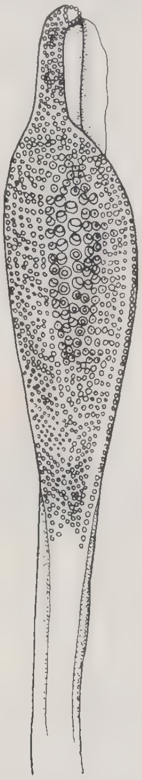
Synonymy : Gonatus magister Berry, 1913; Gonatus septemdentatus Sasaki, 1915.

FAO Names :
En - Schoolmaster gonate squid
Fr - Encornet suçoir
Sp - Gonalura magister

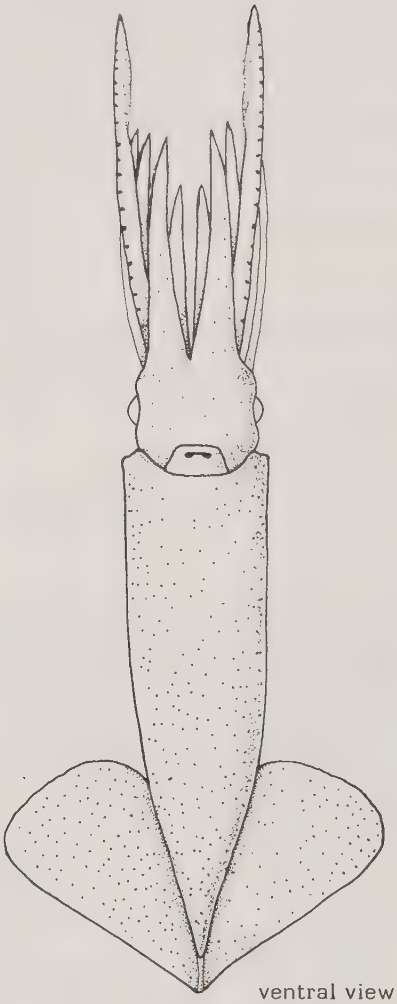
Diagnostic Features : Mantle large, robust, but soft. Fins large, thick, relatively long (up to 55% of mantle length) and broad (their width 70% of mantle length). Tentacles long; clubs expanded, with no hooks but very numerous minute suckers numbering 20 in the transverse rows.

Geographical Distribution : North Pacific: southern Japan, Kurile Islands, Aleutian Islands to northwestern USA.





tentacular club



ventral view

Habitat and Biology : A neritic to oceanic pelagic species; recorded from the surface to about 1 000 m depth; adults are probably associated with the bottom. In Japan, spawning occurs from June to October in depths betwen 200 and 800 m. Particularly abundant in the southern part of the Bering Sea; other concentrations are reported from the Sea of Japan and the Gulf of Alaska. It is preyed upon by sperm whales, northern fur seals and albatrosses (Albatrossia pectoralis); salmonids prey on the larval and juvenile stages.

Size : Maximum mantle length 25 cm.

Interest to Fisheries : Taken seasonally as bycatch in the trawl fishery off the northwestern USA; Japanese fisheries have caught 5 000 to 9 000 tons annually since 1977, but it is possible that these catches include negligible quantities of other cephalopod species. The Japanese intend to increase fishing effort on Berryteuthis magister in the near future. This species also is believed to be taken as bycatch in the Soviet redfish fishery operating in the Bering Sea. The value of this resource could be increased through the development of improved processing technique.

Local Names : JAPAN: Dosuika.

Literature : Kasahara et al. (1978, fisheries development in Japan Inland Sea); Okutani (1980); Osako & Murata (in press, fishery).

4.6 FAMILY PSYCHROTEUTHIDAE Thiele, 1921

PSYCHRO

FAO Names :
En - Glacial squids
Fr - Encornets
Sp - Lurias glaciales

General Remarks on the Family : This monotypic family is based on Psychroteuthis glacialis, described from incomplete specimens from the stomachs of penguins and seals. Because of the inadequate description, the status of the family has been considered doubtful. Recently additional material has become available that confirms the validity of the Psychroteuthidae.

Diagnostic Features : The family is characterized by buccal connectives that attach to the dorsal borders of arms IV, a straight, simple funnel locking-cartilage, absence of photophores on the mantle and head, a tentacular club with 4 to 7 suckers in transverse rows on the manus and dactylus, and biserial suckers on the arms.

Geographical Distribution : Two species, one undescribed, are known at present from Antarctic waters.

Psychroteuthis glacialis Thiele, 1921

PSYCHRO Psy 1

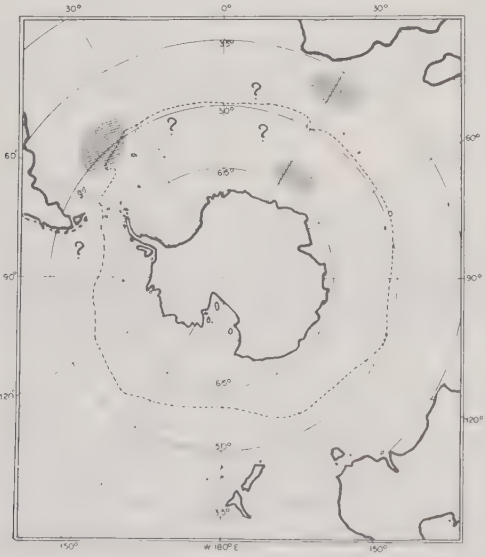
Psychroteuthis glacialis Thiele, 1921, Deut.Südpolar Exped.Zool., 8:440.

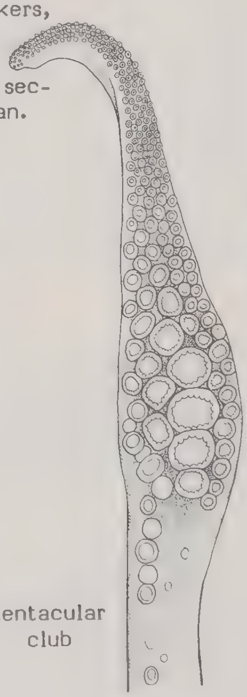
Synonymy : None.

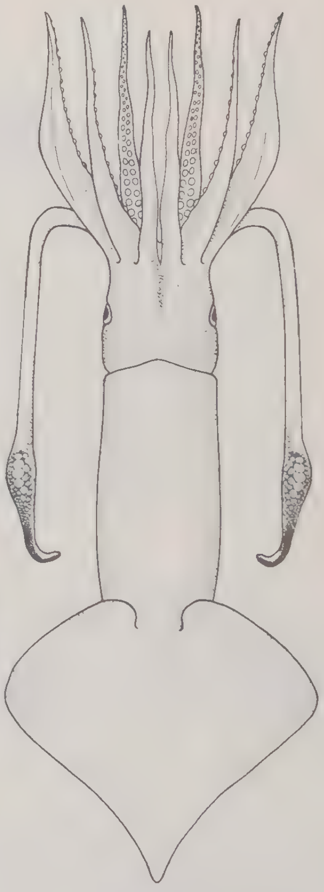
FAO Names :
En - Glacial squid
Fr - Encornet austral
Sp - Luria glacial

Diagnostic Features : Mantle elongate, muscular, tapering to a pointed tail. Fins sagittate, muscular, their length 55% of mantle length; carpal suckers and knobs of tentacular clubs extending proximally along the tentacular stalk; manus with 4 to 7 transverse rows of suckers, those of the ventromedian row considerably enlarged.

Geographical Distribution : Antarctic and subantarctic sectors of the Atlantic; probably widespread in the Southern Ocean.







Habitat and Biology : An oceanic (and neritic ?) species reported from less than 200 to about 700 m depth. It is heavily preyed upon by sperm whales, penguins and Weddel seals.

Size : Maximum mantle length 44 cm.

Interest to Fisheries : Currently no fishery exists, but the size and the consistency of the flesh of this species makes it a potentially valuable resource.

Local Names :

4.7 FAMILY LEPIDOTEUTHIDAE Pfeffer, 1912

LEPIDO

FAO Names : En - Scaled squids
Fr - Loutènes
Sp - Lurias escamudas

General Remarks on the Family : Formerly only a single species, Lepidoteuthis grimaldii, was included in this family. Now, two additional genera are included, Pholidoteuthis and Tetronychoteuthis. A detailed analysis of the three genera is necessary to confirm their relationships, but the lack of sufficient material leads to the uncertain position of these genera. Pholidoteuthis was previously placed in its own family, the Pholidoteuthidae; Tetronychoteuthis has been included in the Onychoteuthidae, although its placement there is clearly unwarranted. Species of Lepidoteuthis and Pholidoteuthis are known to attain large sizes: 97 cm mantle length in Lepidoteuthis and 78 cm mantle length in Pholidoteuthis.

Diagnostic Features : The family Lepidoteuthidae is characterized by the presence of distinct cartilaginous "scales" on the mantle, buccal connectives that attach to the ventral borders of arms IV; a straight, simple funnel locking-cartilage, biserial suckers on the arms, and tetraserial suckers on the tentacular clubs, except in Lepidoteuthis, which lacks tentacles in the adults. Photophores are absent.

The "scales" occur only on the surfaces of the mantle. The posterior end of the mantle, however, is devoid of "scales". The scaleless area on the dorsal side extends nearly to the anterior margin of the fins, but on the ventral side it occurs only on the posterior half or two-thirds of the area covered by the fins.

Pholidoteuthis adami Voss, 1956

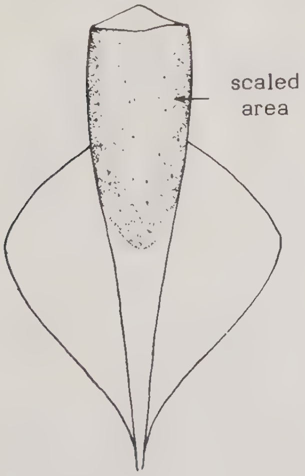
LEPIDO Pholi 1

Pholidoteuthis adami Voss, 1956, Bull.Mar.Sci.Gulf & Caribbean, 6(2):132.

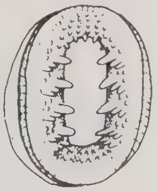
Synonymy : None.

FAO Names : En - Scaled squid
Fr - Loutène commune
Sp - Luria escamuda

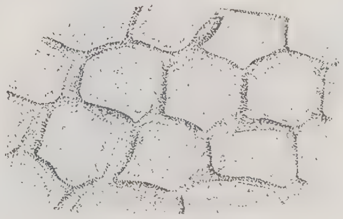
Diagnostic Features : Mantle thick, choroidal, tapering posteriorly to a sharply pointed tail. Fins broad, laterally angled, elongate posteriorly to help form the tail; fins occupy about 70% of the mantle length; anterior half of mantle covered with many small, closely-packed, rounded to polygonal, cartilaginous scales; scalation terminates abruptly dorsally at insertion of fins and ventrally in an arc at about the midpoint of fins. Tentacular clubs very long and only a little expanded; tentacular suckers compressed, oblong. Gladius long and slender, straight-edged with an expanded vane ending in a sharp, conical point.



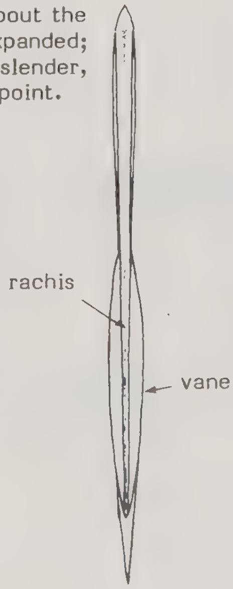
ventral view of mantle and fins



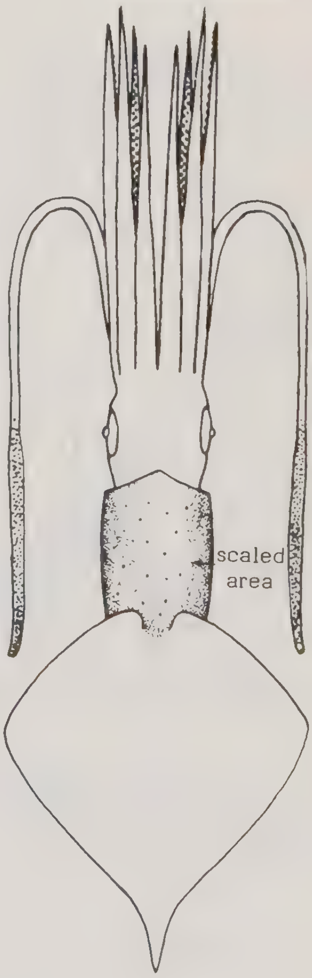
tentacular sucker



cartilaginous scales

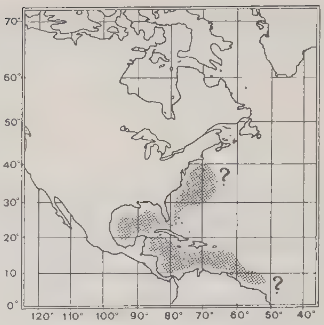


gladius



dorsal view

Geographical Distribution : Western North Atlantic, from about 40°N (very rare) through the Gulf of Mexico and the Caribbean Sea, to northeastern South America.



Habitat and Biology : An oceanic (or epibenthic?) species occurring in offshore waters between 80 and about 935 m depth (greatest abundance between 625 and 750 m), aggregating particularly during the day, while it seems to disperse at night; however, large schools occasionally are observed at night at the surface. Particularly abundant in the Gulf of Mexico.

Size : Maximum mantle length 78 cm.

Interest to Fisheries : Presently there are no fisheries directed at this species, but it is believed to have some potential.

Local Names :

Literature : Okutani (1980).

Pholidoteuthis boschmai Adam, 1950

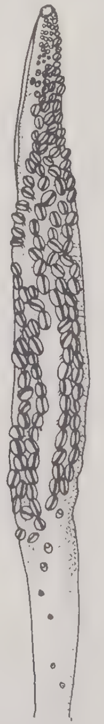
LEPIDO Pholi 2

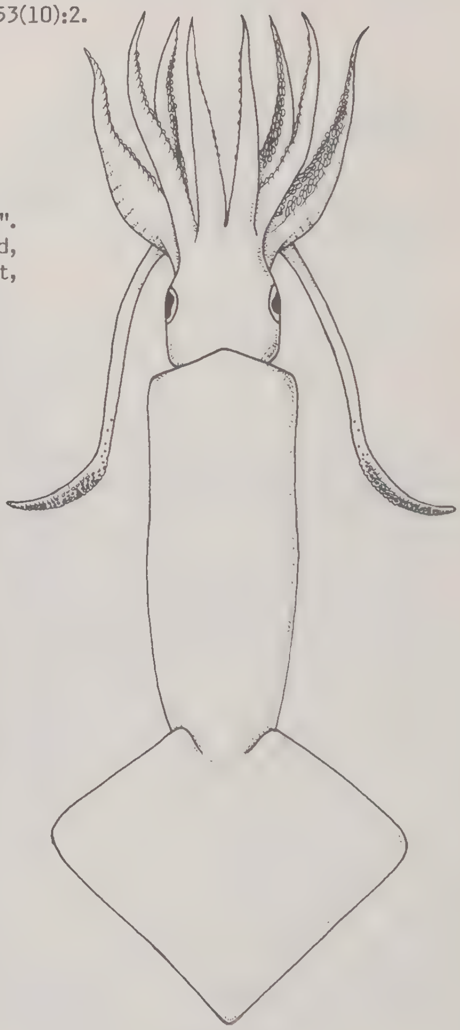
Pholidoteuthis boschmai Adam, 1950, Konin.Neder.Akad.Wetersch., 53(10):2.

Synonymy : None.

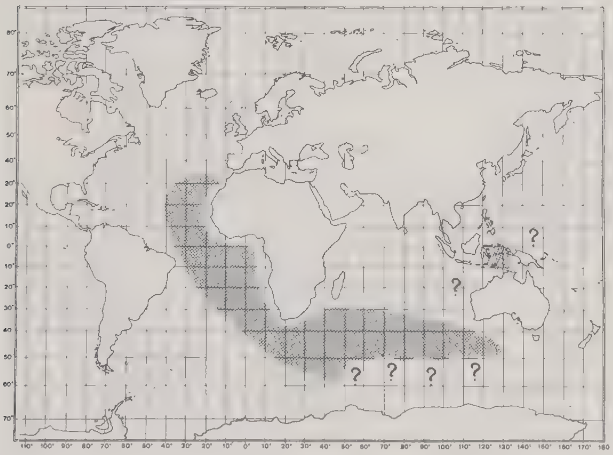
FAO Names : En - Coffeebean scaled squid
Fr - Loutène battoir
Sp - Luria escamuda cafetal

Diagnostic Features : Mantle elongate, covered with small "scales". Fins 40 to 50% of mantle length, muscular. Tentacular clubs unexpanded, with laterally compressed suckers with bluntly toothed rings. Arms stout, sucker rings with about 18 sharp teeth.


tentacular club


dorsal view

Geographical Distribution : Central and southeastern Atlantic; southern Indian Ocean; Banda and eastern Java seas.



Habitat and Biology : An oceanic species; reported to occur between the surface and 2 000 m depth. Heavily preyed upon by sperm whales in the Southern Ocean.

Size : Maximum mantle length 60 cm.

Interest to Fisheries : This species is believed to have some fishery potential because of its large size and muscular consistency.

Local Names :

4.8 FAMILY ARCHITEUTHIDAE Pfeffer, 1900

ARCHI

FAO Names : En - Giant squids
Fr - Encornets monstres
Sp - Megalurias

General Remarks on the Family : This family includes the largest of all cephalopods. Specimens occasionally are found moribund at the surface of the ocean, but most records are from strandings or whale stomachs. Apparently world-wide in distribution.

Many species have been named in the sole genus of the family, Architeuthis, but they are so inadequately described and poorly understood that the systematics of the group is thoroughly confused. Total lengths of nearly 20 m and mantle lengths of nearly 6 m (not a complete specimen) have been recorded.

Juveniles of species have been reported from both the Atlantic and Pacific Oceans.

Diagnostic Features : The Architeuthidae is characterized by a tetraserial armature on the tentacular clubs with large suckers in the medial rows of the manus and small suckers in the marginal rows; a distinct cluster of numerous small suckers and knobs at the proximal end of the manus; two longitudinal rows of alternating suckers and pads on the tentacular stalks; a straight simple funnel locking-cartilage; buccal connectives that attach to the dorsal border of arms IV; absence of photophores.

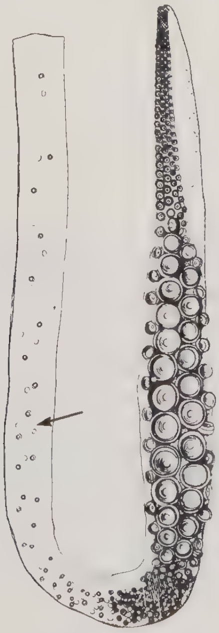
Architeuthis species

ARCHI Archi

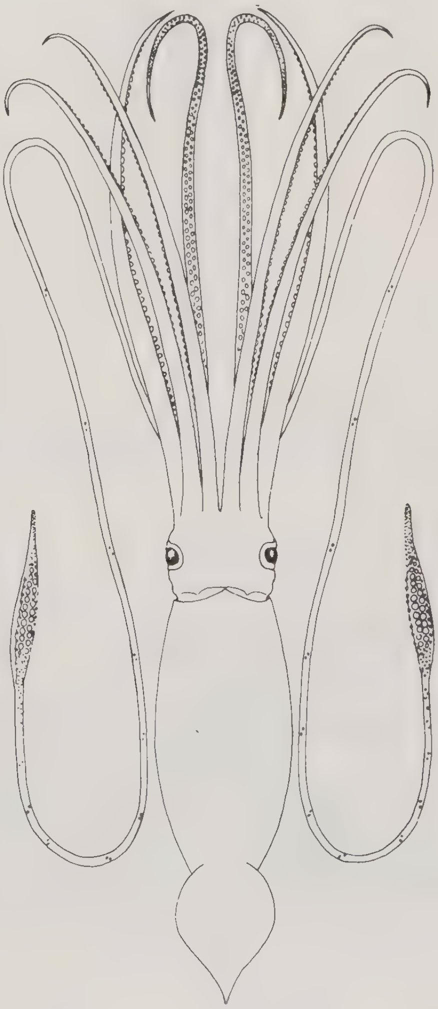
Synonymy : None.

FAO Names : En - Giant squid
Fr - Encornet monstre
Sp - Megaluria

Diagnostic Features : Animals huge, up to 20 m total length. Tentacular clubs with 4 rows of suckers on manus, a large cluster of very numerous small suckers on carpus with small suckers and knobs extending in pairs proximally along the stalk. Both arms (IV) hectocotylized in males.

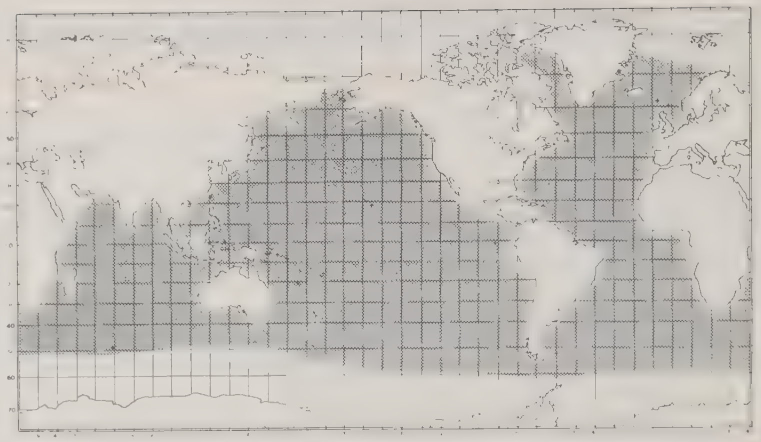


tentacular club



dorsal view

Geographical Distribution : A worldwide genus most abundant in the North Atlantic (Newfoundland, Norway), the Southern Ocean, New Zealand and in the North Pacific.



Habitat and Biology : An oceanic genus, believed to occur between about 200 and 400 m depth, perhaps to 500 m or more, but a significant number of specimens has been observed at the surface of the sea. The juveniles and adults are heavily preyed upon by sperm whales, while the juveniles are subjected to predation by mesopelagic fishes such as Aphanopus carbo and Alepisaurus ferox.

Size : Maximum total length 20 m; maximum mantle length 6 m; weight 500 to 1 000(?) kg.

Interest to Fisheries : The species has no commercial value at present. The flesh contains ammonium ions, so it must be soaked prior to consumption to remove the bitter taste.

Local Names :

Literature : Clarke (1966, brief synthesis of known records, photo); Roper & Boss (1982, biology).

4.9 FAMILY HISTIOTEUTHIDAE Verrill, 1881

HISTIO

FAO Names : En - Jewell squids, Umbrella squids
Fr - Loutènes
Sp - Joyelurias

General Remarks on the Family : The family has been monographed by N. Voss (1969); 15 species of the genus Histioteuthis inhabit the world oceans.

Some species are extremely abundant, and some are quite large; most are major items in the diets of sperm whales. Some potential for a specialized market might exist.

Diagnostic Features : This monotypic family is easily distinguished by large, anteriorly directed photophores over the surface of the mantle, head and arms; a large head with the left eye considerably larger than the right; six or seven buccal lappets; buccal connectives that attached to the dorsal border of arms IV; a straight or slightly curved and slightly broad, simple, funnel locking-cartilage; suckers on the tentacular clubs arranged in four, or more commonly, more than four irregular rows; suckers on the arms biserial.

Histioteuthis bonnellii (Ferussac, 1835)

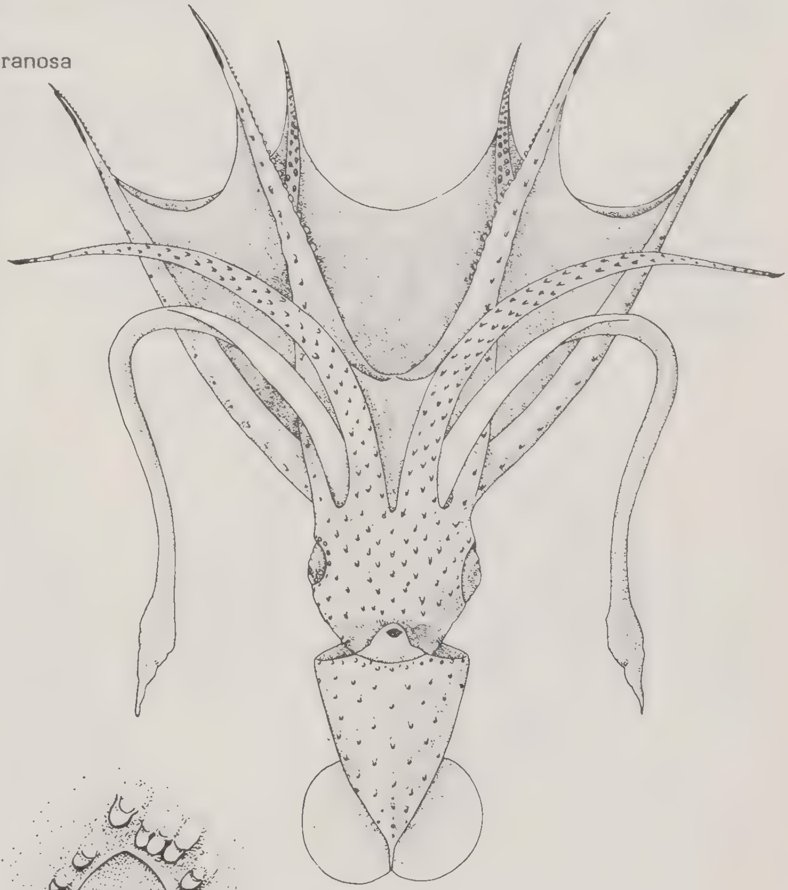
HISTIO Histio 1

Cranchia bonnellii Ferussac, 1835, Mag.Zool., 5, pl. 66.

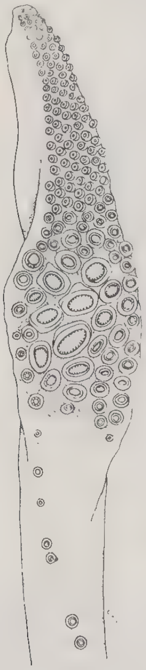
Synonymy : Cranchia bonnellii Ferussac, 1835; Cranchia bonelliana Ferussac, 1835; Histioteuthis bonelliana Orbigny, 1835-1848; Histioteuthis rüppelli Verany, 1851; Histioteuthis collinsi Verrill, 1879; Histiopsis atlantica Hoyle, 1885.

FAO Names :
En - Umbrella squid
Fr - Loutène bonnet
Sp - Joyeluria membranosa

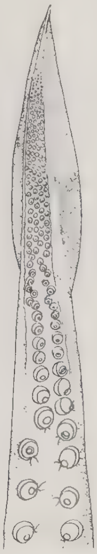
Diagnostic Features : Mantle relatively short, broad, conical, covered with dark, elongate photophores on ventral and lateral surfaces (also on head and arms). Fins oval; head large. Arms long, connected with a very broad deep, maroon-coloured web; distinct, elongate dark light organs on arm tips. Seventeen small, oval light organs around periphery of right eyelid.



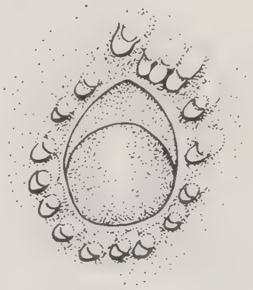
ventral view



tentacular club

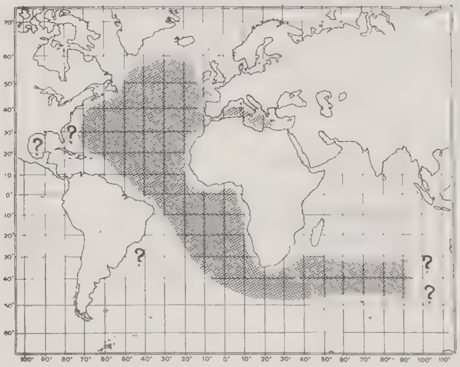


right arm I



eyelid

Geographical Distribution : Eastern and western central Atlantic and western Mediterranean; southeastern Atlantic and south Indian Ocean (limits undetermined).



Habitat and Biology : An oceanic species; reported to occur usually in depths between 500 and 1 500 m, sometimes associated with the bottom. Growth seems to be isometric and even minute specimens have the proportions of adults. Although they are usually taken singly or in pairs in nets, it is suspected, from evidence in sperm whale stomachs, that it is a schooling species. Apart from sperm whales it is preyed upon by Alepisaurus ferox, Aphanopus carbo and Thunnus alalunga.

Size : Maximum mantle length 33 cm (the largest Histioteuthis species).

Interest to Fisheries : The species is believed to have some fishery potential.

Local Names :

Histioteuthis dofleini (Pfeffer, 1912)

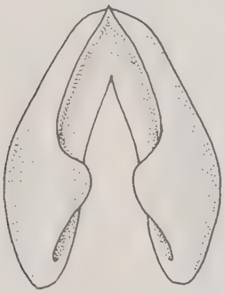
HISTIO Histio 2

Stigmatoteuthis dofleini Pfeffer, 1912, Ergebn.Atlant. Ozean Planktonexped.Humboldt-Stift., 2:288.

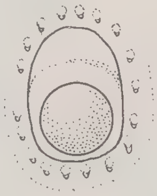
Synonymy : Stigmatoteuthis chuni Pfeffer, 1912; Stigmatoteuthis dofleini Pfeffer, 1912; Stigmatoteuthis arcturi Robson, 1948.

FAO Names : En - Flowervase jewell squid
Fr - Loutène vase
Sp - Joyeluria floral

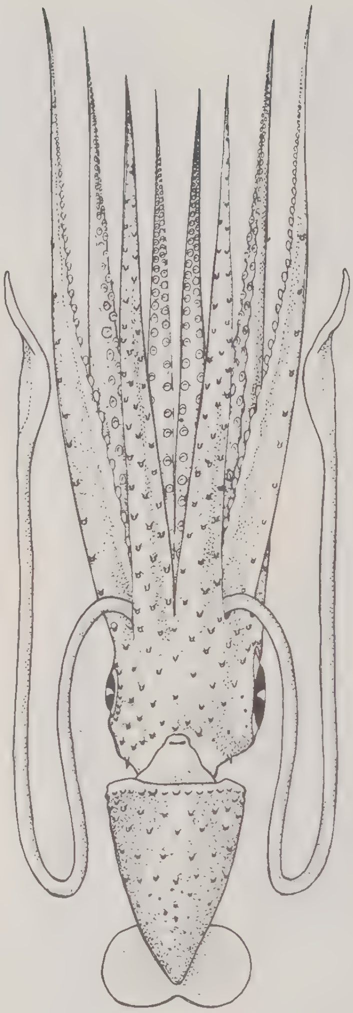
Diagnostic Features : Mantle conical, relatively thick-walled; skin of whole body covered with thickly spaced, low, fleshy papillae; ventral and lateral surfaces covered with elongate photophores; fin round. Head large. Arms very long, without distinct photophores on tips; web between arms very low, indistinct. Seventeen small photophores around right eyelid.



funnel organ

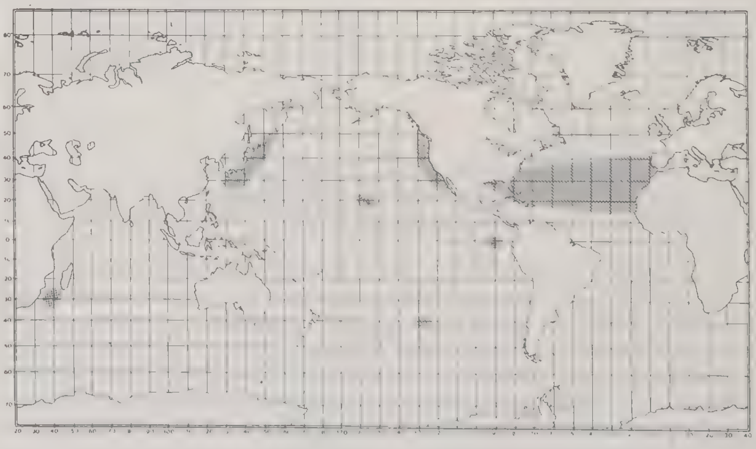


eyelid



ventral view

Geographical Distribution : World-wide in northern and southern warm-temperate waters; southeast Africa, Madagascar; west of the Galapagos Islands, off California, Hawaii and Japan; South Pacific.



Habitat and Biology : An oceanic species, abundant in midwater layers; frequently found in predators' stomachs.

Size : Maximum mantle length 12 cm.

Interest to Fisheries : Undetermined.

Local Names : JAPAN: Kuragedako.

Literature : Voss (1969)

Histioteuthis elongata (Voss & Voss, 1962)

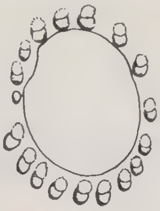
HISTIO Histio 3

Calliteuthis elongata Voss & Voss, 1962, Bull.Mar.Sci.Gulf & Carib., 12(2):184.

Synonymy : Calliteuthis elongata Voss & Voss, 1962.

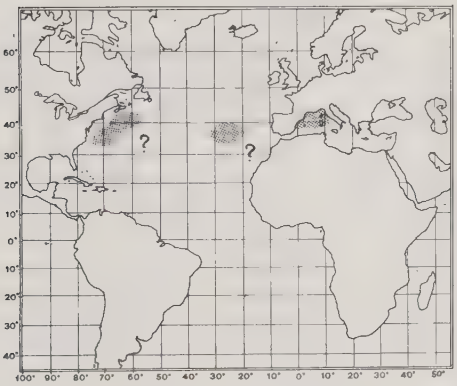
FAO Names :		
	En -	Elongate jewell squid
	Fr -	Loutène longue
	Sp -	Joyeluria alargada

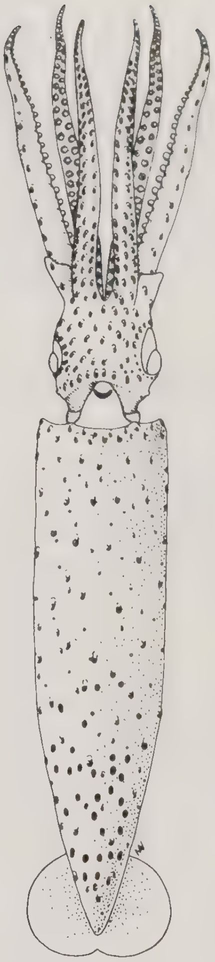
Diagnostic Features : Mantle very long and slender, covered (especially on ventral and lateral surfaces) with scattered light organs especially large and dark on posterior end. Fins very short, rounded; head small. Arms robust, no distinct photophores on tips; web between arms undeveloped. Eighteen photophores around right eyelid.



eyelid

Geographical Distribution : North Atlantic and Mediterranean; largely undetermined.





ventral view

Habitat and Biology : An oceanic species, taken between 500 and 1 000 m depth with closing nets. The largest specimens were found dead at the surface; these probably were spent females.

Size : Maximum mantle length 20 cm.

Interest to Fisheries : Currently none.

Local Names :

Literature : Lu & Roper (1979).

4.10 FAMILY NEOTEUTHIDAE Naef, 1921

NEO

FAO Names :
En - Neosquids
Fr - Loutènes
Sp - Neolurias

General Remarks on the Family : Two genera, Alluroteuthis Odhner, 1923, and Neoteuthis Naef, 1921, are known. Odhner (1923) suggested that Parateuthis tunicata Thiele, 1921, might be the large form of the monotypic Alluroteuthis antarcticus

Diagnostic Features : The family is characterized by biserial suckers on the arms, 4 rows of suckers on the distal part of the manus and dactylus, and numerous small suckers on the proximal end of the manus, buccal connectives that attach to the dorsal borders of arms IV, a straight, simple funnel locking-cartilage, anterior fin lobes absent and posterior fin lobes free, and absence of photophores.

Alluroteuthis antarcticus Odhner, 1923

NEO Allu 1

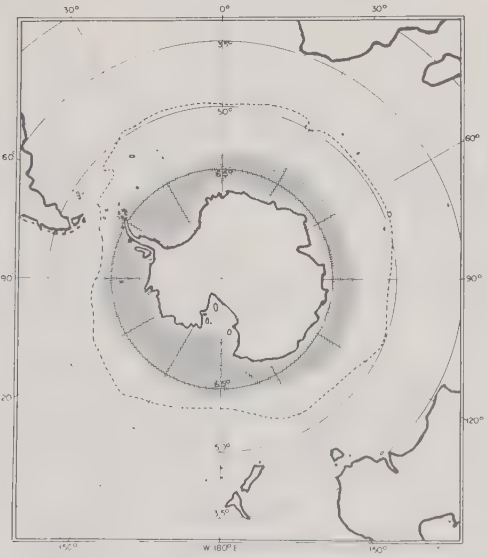
Alluroteuthis antarcticus Odhner, 1923, Zool.Results Swed.Ant.Exp., 1(4):2.

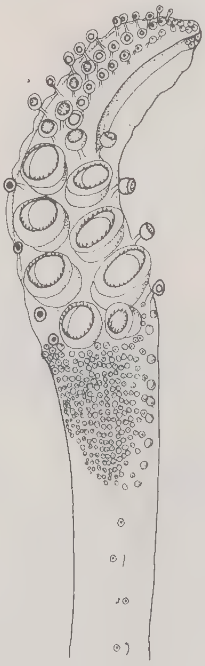
Synonymy : Parateuthis tunicata Thiele, 1921.

FAO Names :
En - Antarctic neosquid
Fr - Loutène australe
Sp - Neoluria antártica

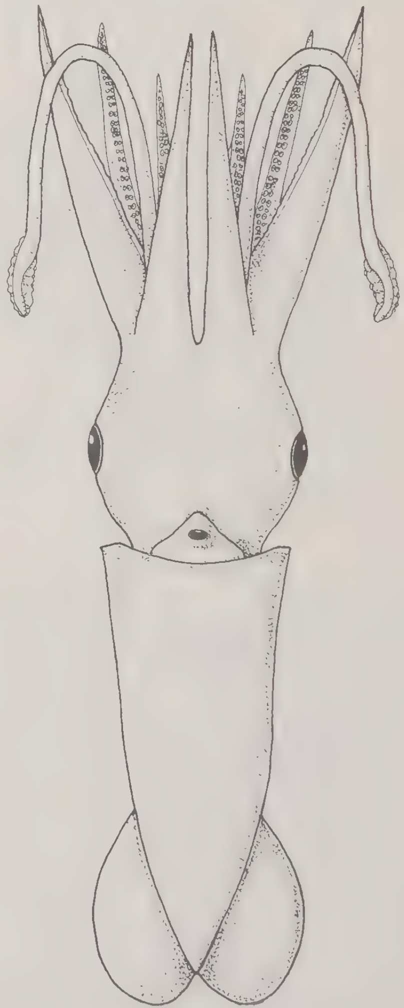
Diagnostic Features : Mantle conical. Fins oval, their posterior lobes free; head and eyes large. Tentacles relatively thin; clubs with 6 to 8 enlarged suckers on median rows of manus, many rows of very small, extremely numerous suckers on carpus, with a few pairs of suckers/knobs extending proximally along the stalk. Arms robust; suckers on arms IV reduced in size.

Geographical Distribution : Atlantic and Indian sectors of the Antarctic Ocean.





tentacular club



ventral view

Habitat and Biology : An oceanic species, occurring in depths between 750 and 2 800 m.

Size : Maximum mantle length 10 cm.

Interest to Fisheries : Currently none.

Local Names :

4.11 FAMILY BATHYTEUTHIDAE Pfeffer, 1900

BATHY

FAO Names : En - Deepsea squids
Fr - Loutènes abyssales
Sp - Batilurias

The family is distinguished by the presence of a straight funnel locking-cartilage, buccal connectives that attach to the dorsal borders of arms IV, suckers on the buccal lappets, small clubs with many rows of minute suckers, round or paddle-like subterminal fins (i.e., posterior margins convex), suckers on the arms arranged in irregular rows (2 rows proximally increasing to 4 distally), and a deep maroon colour. A single photophore is embedded at the base of each arm I to III (this is easily apparent in young specimens but may be obscure in adults).

The family contains a single genus, Bathyteuthis, with three species. The most common species, B. abyssicola, is a deep sea form that has been recorded from all major oceans and is most abundant between 1 000 and 2 500 m; B. abyssicola is one of the most numerous cephalopods in the Antarctic waters.

Bathyteuthis abyssicola Hoyle, 1885

BATHY Bathy 1

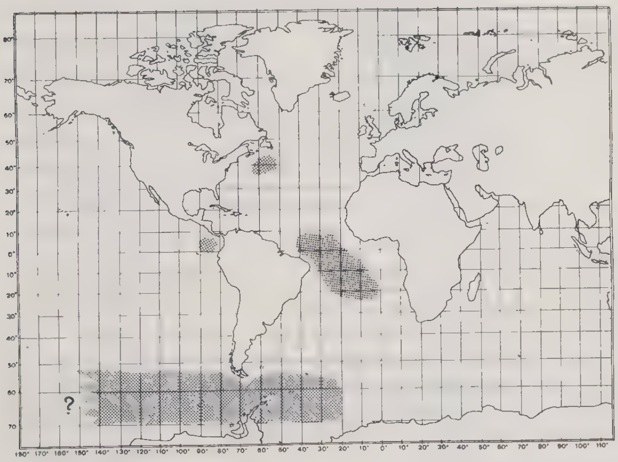
Bathyteuthis abyssicola Hoyle, 1885, Proc.Roy.Soc.Edinburg, 13(120):272.

Synonymy : Benthoteuthis megalops Verrill, 1885.

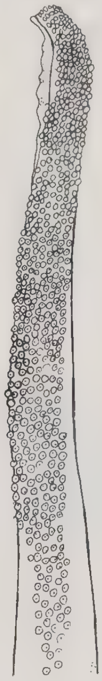
FAO Names : En - Deepsea squid
Fr - Loutène abyssale
Sp - Batiluria

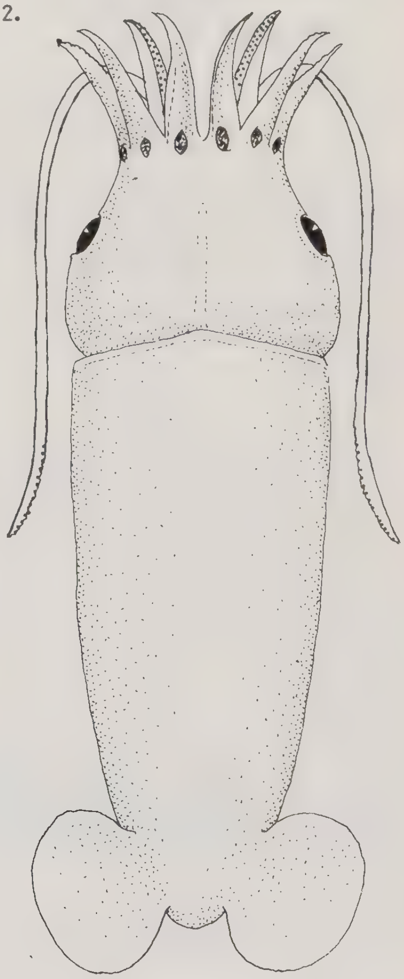
Diagnostic Features : Mantle robust, bluntly rounded posteriorly. Fins round, small, separate, short; eyes orient slightly anteriorly. Clubs unexpanded, short, with relatively few, small, coequal suckers. Arms short, with few small suckers and no enlarged trabeculae; colour deep maroon.

Geographical Distribution : Worldwide in the Southern Ocean and productive waters of the eastern Pacific, Atlantic, and Indian Oceans.



Habitat and Biology : An oceanic species occurring between about 100 m and 4 200 m depth, but normally encountered between 700 and 2 000 m. Believed to carry out diel vertical migrations between lesser depths (up to 100 m at night) and greater depths during the day.


tentacular club


dorsal view

Size : Maximum mantle length 7 cm; mantle length at first maturity is about 4 or 5 cm in females and 3.5 cm in males.

Interest to Fisheries : Although the species is abundant in the Southern Ocean, it presently has no commercial value.

Local Names :

Literature : Roper (1969, monograph, distribution, biology).

4.12 FAMILY BRACHIOTEUTHIDAE Pfeffer, 1908

BRACHIO

FAO Names : En - Arm squids
Fr - Encornets bras courts
Sp - Braquilurias

This family is monotypic and characterized primarily by the presence of numerous rows of small suckers on the proximal portion of the tentacular clubs; straight, simple funnel locking cartilage; ventral attachment of the buccal connectives to arms IV; two rows of suckers on the arms; long slender bodies with relatively short terminal fins. Some species of Brachioteuthis have peculiar larvae with characteristic, long, slender necks. The family is greatly in need of a revision.

Brachioteuthis picta Chun, 1910

BRACHIO Brachio 1

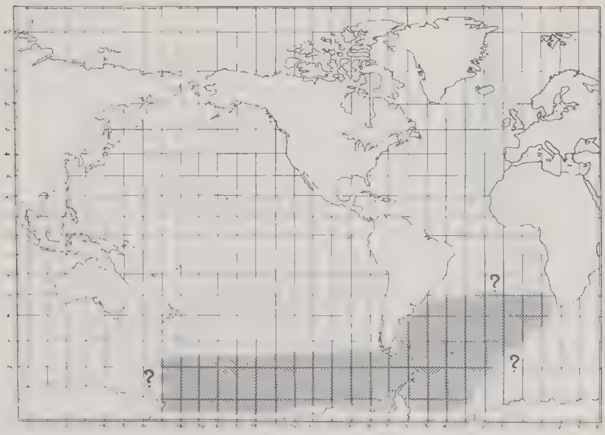
Brachioteuthis picta Chun, 1910, Sci.Res.Exped.Valdivia, 18:207.

Synonymy : None.

FAO Names : En - Ornate arm squid
Fr - Encornet bras courts orné
Sp - Braquiluria moteada

Diagnostic Features : Mantle long, slender, produced posteriorly into a tail. Fins saggitate, their length about 50% of mantle length. Tentacular clubs expanded, covered with numerous minute suckers in the carpal region that extend proximally along the club.

Geographical Distribution : Southern Ocean, Atlantic and Pacific sectors; distribution limits undetermined due to uncertain identification in the literature.

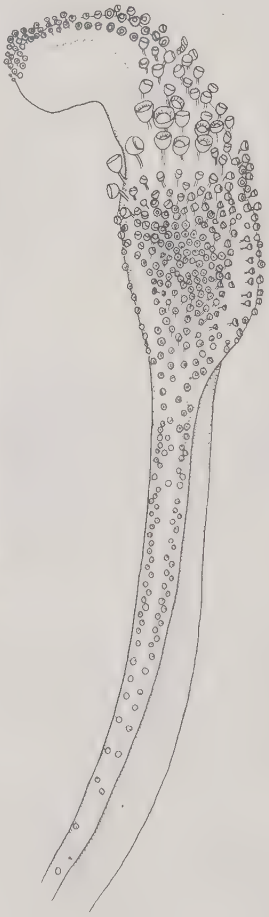


Habitat and Biology : An oceanic species primarily occurring in the upper 500 m of the water column, but its depth range may extend to 1 000 m.

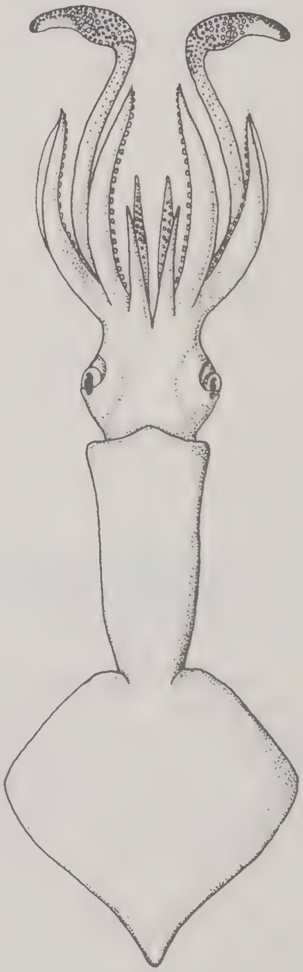
Size : Maximum mantle length 9 cm.

Interest to Fisheries : Undetermined.

Local Names :



tentacular club



dorsal view

Brachioteuthis riisei (Steenstrup, 1882)

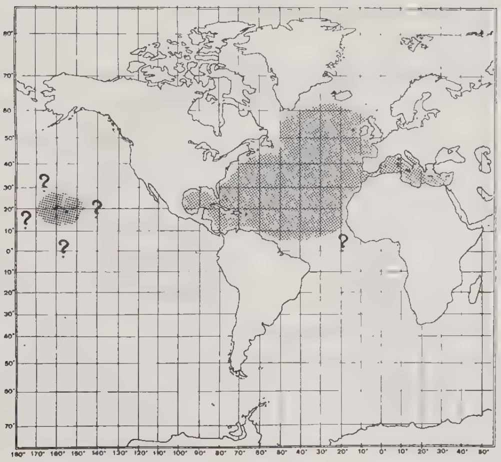
Tracheloteuthis riisei Steenstrup, 1882, Vid.Medd. Nat.Foren.Kjobenk, 4(3):294.

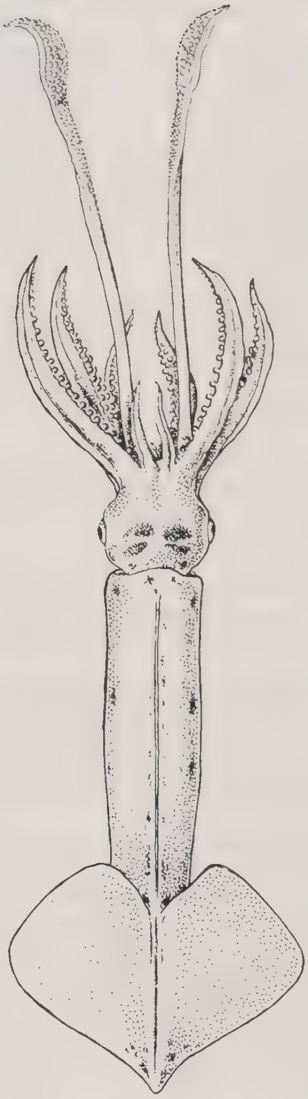
Synonymy : Tracheloteuthis riisei Steenstrup, 1882; Verrillida gracilis Pfeffer, 1884; Verrilliola nympha Pfeffer, 1884; Entomopsis velaini Rochebrune, 1884; Entomopsis clouei Rochebrune, 1884; Entomopsis aluei Joubin, 1900.

FAO Names :
En - Common arm squid
Fr - Encornet bras courts commun
Sp - Braquiluria común

Diagnostic Features : Mantle very elongate, muscular. Fins less than 50% of mantle length, saggitate. Tentacular clubs narrow with very numerous minute suckers in the proximal portion.

Geographical Distribution : North Atlantic and central Pacific Oceans, limits undetermined due to uncertain identification in the literature.





dorsal view

Habitat and Biology : An oceanic species, occurring from the surface to 3 000 m depth. The spawning season appears to be very extended, hence recently hatched juveniles are found throughout the year. In the North Atlantic, these are particularly abundant from May to August and in February; in the Mediterranean and in upwelling areas off northwest Africa, between 10 and 30°N, from April to July, in September and from December to February.

Size : Maximum mantle length 3.5 cm.

Interest to Fisheries : Undetermined.

Local Names :

Literature : Kluchnik (1978, distribution of hatchlings).

4.13 FAMILY OMMASTREPHIDAE Steenstrup, 1857

OMMAS

Ommastrephidae Steenstrup, 1857, *Overs.Vidensk.Selsk.Forh.*, 1857:12.

FAO Names : En - Flying squids
Fr - Encornets, Calmars
Sp - Jibias, Potas

Diagnostic Features : The family is characterized by an inverted T-shaped funnel locking cartilage, biserial suckers on the arms, tetraserial suckers on the tentacular clubs (except *Illex* which has 8 rows of suckers on the dactylus), buccal connectives that attach to the dorsal borders of arms IV, photophores in some genera, and a muscular bridge anterior to the funnel locking cartilage which passes from the funnel to the ventral surface of the head.

The inverted T-shaped funnel locking cartilage easily distinguishes this family from all others, even in the youngest stages. One genus, *Symplectoteuthis*, has the funnel and mantle cartilages fused at a single point, but they are otherwise typical.

Three subfamilies are currently recognized: Ommastrephinae, Todarodinae, and Illicinae.

The Ommastrephinae is distinguished by the presence of a central pocket (foveola) and several side pockets in the funnel groove, and by the presence of photophores which are often deeply buried in the tissue of the mantle, head and arms. It comprises five genera: *Ommastrephes*, *Symplectoteuthis*, *Dosidicus*, *Ornithoteuthis* and *Hyaloteuthis*.

The Todarodinae has a foveola, but lacks side pockets in the funnel groove, and lacks photophores. Three genera are known: *Todarodes*, *Nototodarus* and *Martialia*. *Nototodarus* is known only from the Pacific Ocean, and *Martialia* only from far southern waters of the Southern Hemisphere.

The Illicinae lacks both central and side pockets in the funnel groove as well as photophores. Two genera are known *Illex* from the Atlantic Ocean and *Todaropsis* from the Atlantic and eastern Indian Ocean.

All species of the family in which the developmental stages are known, pass through the "rhynchoteuthis" larval stage recognized by the fusion of the tentacles to form a trunk-like proboscis.

Habitat and Biology : All representatives of this oceanic and neritic family, but particularly the species in the subfamily Ommastrephinae, are very strong, powerful swimmers; most of them undertake diurnal vertical movements between the surface layer at night and deeper layers during the day. Several species school by size and migrate seasonally in response to changes of temperature conditions. Two spawning peaks are often distinguished. Large numbers of small eggs are produced, encapsuled in gelatinous masses that either float on or near the surface or settle on the bottom. Hatching of the "rhynchoteuthis" larvae occurs after a few days to a few weeks. Postspawning mortality is high. Growth is very rapid; in many species the lifespan does not exceed 1 year. Flying squids are active predators on fishes, pelagic crustaceans and other squids. Cannibalism is common. Ommastrephids in turn are preyed upon by sea birds, marine mammals and large predacious fishes, such as tunas, billfishes, etc.

Size : *Dosidicus*, the giant of the family, inhabiting the cold Humboldt Current, reaches a total length of about 4 m; common mantle lengths range between 20 and 40 cm.

Interest to Fisheries : Six of the 10 genera of this family currently support a fishery, and although much of the catch is not broken down between inshore squids and flying squids, it can reasonably be assumed that this family alone accounts for more than half of the world cephalopod catch. *Todarodes pacificus* supports the largest single fishery with catches fluctuating between 230 000 and 400 000 metric tons in recent years (FAO, 1983). Other important international fisheries are those for *Illex illecebrosus* in the northwestern Atlantic; *Illex argentinus* on the Patagonian shelf and upper slope; *Todarodes sagittatus* off Norway and in the Mediterranean; *Ommastrephes bartrami* in the western Pacific; *Dosidicus gigas* in the temperate and cold eastern boundary currents of the eastern Pacific; and *Nototodarus* in New Zealand and most recently in Australian waters. Japan predominates in most ommastrephid fisheries.

Trawling and jigging are by far the most common fishing methods, results of the latter being greatly improved by light attraction, taking advantage of the positive phototaxis of most species.

Squids are marketed fresh (i.e. sashimi), frozen, or processed in various ways, such as, dried (surume), salted, salted-fermented. Jigged squids fetch the highest prices because the product is usually fresher and undamaged.

Key to Genera :

1a. Funnel groove smooth, without foveola or side pockets .... **Subfamily Illicinae**

2a. Dactylus of tentacular club with 8 longitudinal rows of small suckers (Fig. 1a) .... **Illex**

2b. Dactylus of tentacular club with 4 longitudinal rows of small suckers (Fig. 1b) ... **Todaropsis**

1b. Funnel groove with foveola or with foveola and side pockets

3a. Funnel groove with foveola only, no side pockets (Fig. 2a) .... **Subfamily Todarodinae**

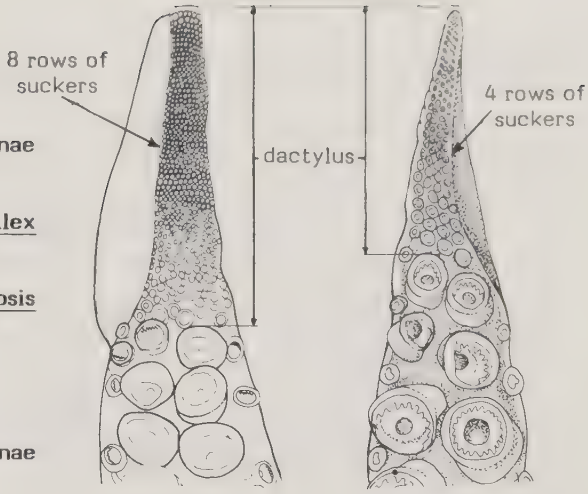
4a. Both arms IV of males hectocotylized (Fig. 3a) .... **Nototodarus**

4b. One arm IV of males hectocotylized (usually the right) (Fig. 3b)

5a. Protective membranes on the arms very low, weakly developed, but trabeculae very strongly developed with pointed cirrus-like projections (Fig. 4) .... **Martialia**

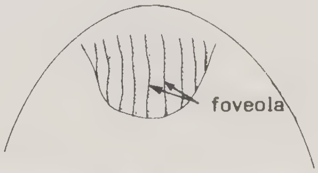
5b. Protective membranes on arms normally developed with normal, non-projecting trabeculae (Fig. 5) .... **Todarodes**

3b. Funnel groove with foveola and side pockets (Fig. 2b) .... **Subfamily Ommastrephinae**

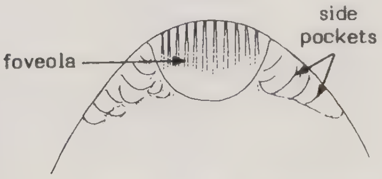

8 rows of suckers
dactylus
4 rows of suckers

a. Illex b. Todaropsis

Fig. 1



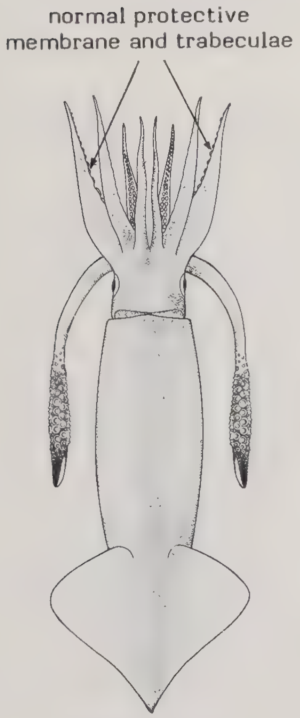
a. Subfamily Todarodinae


side pockets
foveola

b. Subfamily Ommastrephinae

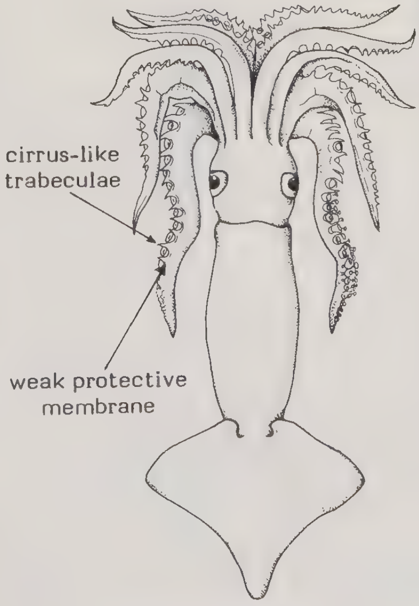
funnel groove

Fig. 2


normal protective membrane and trabeculae

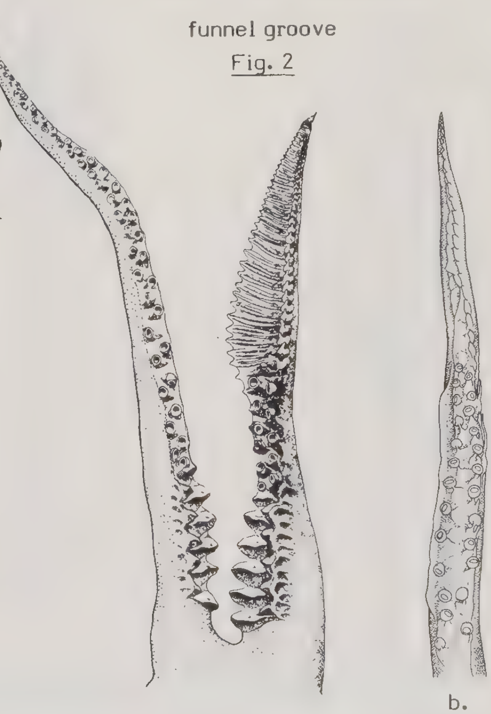
dorsal view Todarodes

Fig. 5


cirrus-like trabeculae
weak protective membrane

dorsal view Martialia

Fig. 4



a. arms IV of male hectocotylized

b. right arm IV of male hectocotylized

Fig. 3

6a. Funnel and mantle components of the locking apparatus are fused together (Figs 6a, 7) .... **Symplectoteuthis**

6b. Funnel and mantle components of the locking apparatus are free, not fused (Fig. 6b)

  7a. Tips of arms very attenuate with numerous minute, closely packed suckers (Fig. 8) .... **Dosidicus**

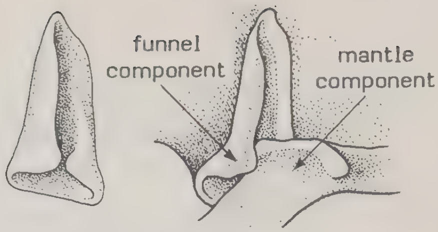
  7b. Tips of arms normal, not attenuate (Fig. 11); suckers not unusually numerous, small or crowded

    8a. Nineteen discrete, round light organs in a distinctive pattern on ventral surface of mantle (Fig. 9) ...... **Hyaloteuthis**

    8b. No discrete, round light organs on ventral surface of mantle

      9a. Mantle elongate, slender, posteriorly drawn out into a pointed tail (Fig. 10); a stripe of luminous tissue (often pinkish) along ventral midline of viscera; side pockets often obscure .... **Ornithoteuthis**

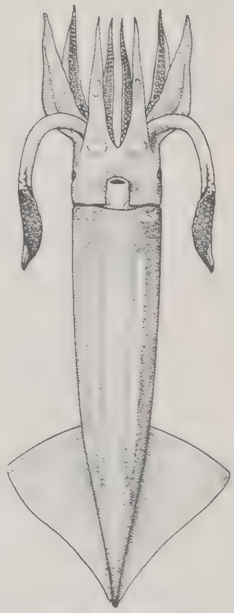
      9b. Mantle robust, not drawn out posteriorly in a tail (Fig. 11); no (pinkish) stripe of luminous tissue along ventral midline of viscera (1 or 2 small, round, discrete light organs in region of ink sac in some forms); side pockets distinct ... **Ommastrephes**



a. funnel component free

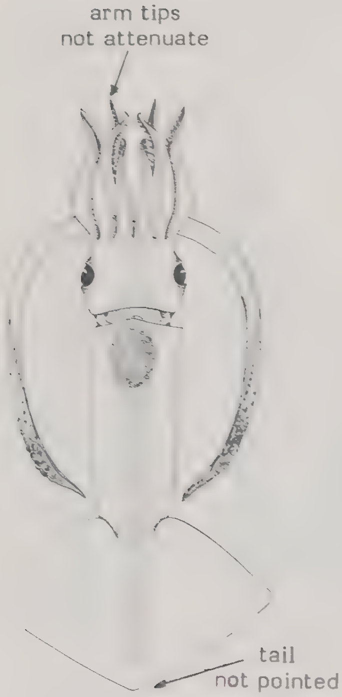
b. funnel component fused with mantle component

Fig. 6



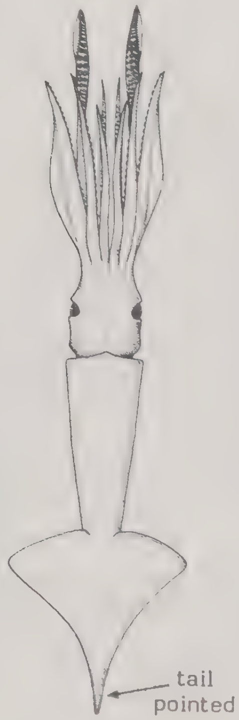
ventral view
Symplectoteuthis

Fig. 7



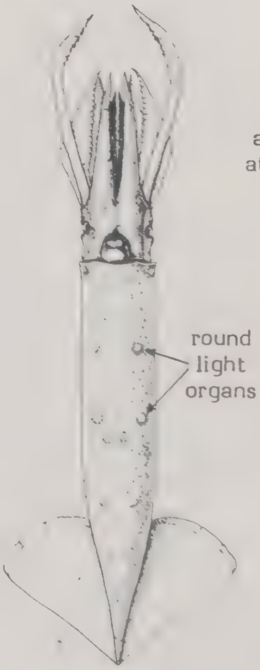
dorsal view
Ommastrephes

Fig. 11



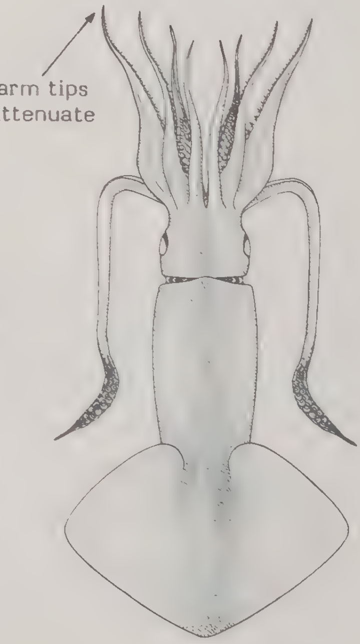
dorsal view
Ornithoteuthis

Fig. 10



ventral view
Hyaloteuthis

Fig. 9



dorsal view
Dosidicus

Fig. 8

Illex argentinus (Castellanos, 1960)

Ommastrephes argentinus Castellanos, 1960, Neotropica, 6(20):55.

Synonymy : Ommastrephes argentinus Castellanos, 1960.

FAO Names :
En - Argentine shortfin squid
Fr - Encornet rouge argentin
Sp - Pota argentina

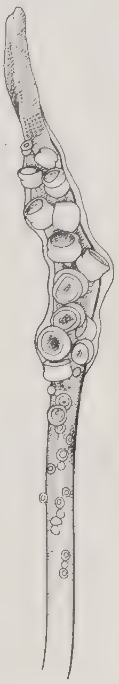
Diagnostic Features : Mantle long, muscular, widest at midpoint. Fins muscular, relatively short (length 42% of mantle length) and broad (width 57% of mantle length); fin angle broad, 45 to 55° (90 to 110° both fins). Arms very long for the genus, averaging up to 72% of mantle length for arms III in males; all arms of males significantly longer than in females; right (or left) arm IV hectocotylized along more than 50% of its length with suckers and stalks modified into suckerless knobs, truncate lamellae, and narrow lamellae to the tip.

Geographical Distribution : Western South Atlantic: Approximately 30°S to 50°S.

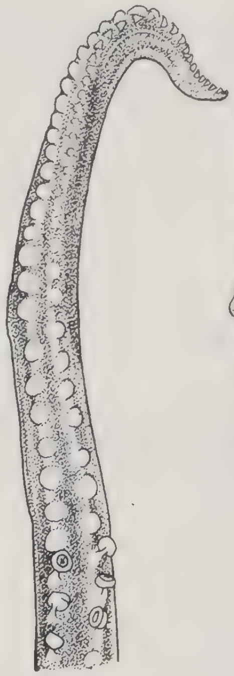
Habitat and Biology : An oceanic and neritic species occurring from the surface to about 800 m depth. In autumn and winter (April to September) it is abundant on the lower shelf (50 to 200 m depth).

The spawning season extends through the summer from December to March. Growth is very fast with total length averaging about 40 cm in the following summer. Longevity is between 1 and 2 years. Argentine shortfin squid prey on fishes (juvenile hakes), pelagic crabs and shrimps. They are in turn preyed upon by finfishes such as adult hake (Merluccius hubbsi).

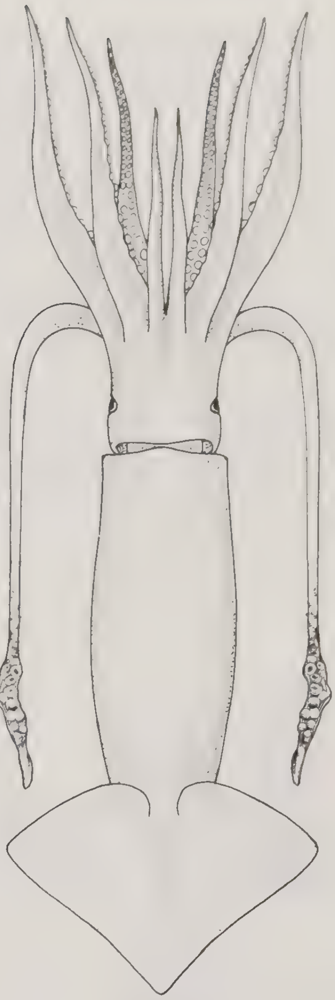
Size : Maximum mantle length 33 cm; sexual maturity is reached at a total length of about 24 cm.



tentacular club

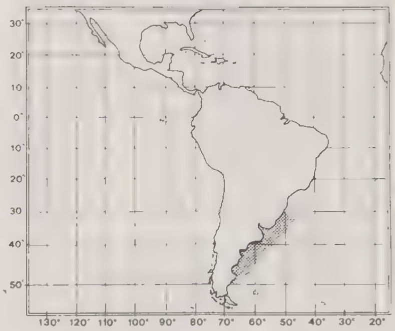


arm IV of male hectocotylized



dorsal view

Interest to Fisheries : Taken as by-catch to the otter trawl fishery for hake or alternating with the hake fishery off Argentina and Uruguay on the continental shelf in depths between 30 and 200 m. Catches in the latter country increased from some 100 to 200 metric tons between 1968 and 1974, to 4 600 metric tons in 1979 (Leta, 1981), but deteriorated to 3 000 metric tons in 1981 (FAO, 1983). Argentinian catches, accounting for more than 90% of the 92 000 metric tons taken in Fishing Area 41 in 1979, were largely accounted for by Japanese vessels fishing in Argentinian waters under joint venture arrangements, and most of the catch was frozen and exported to Japan and Spain. Due to the strengthening of restrictions on foreign fisheries, Japanese vessels have started directing their effort to squids outside the 200 mile limit. Subsequently Argentine catches decreased to about 9 000 and 10 600 metric tons in 1980 and 1981 respectively (FAO, 1983). It is also suspected that the sustainable yield of the species may be lower than suggested by previous estimate which did not account for the fact that there was no "virgin stock" when fishing started, because the squids were already heavily "exploited" through predation by hake.



The flesh of Illex argentinus is lower in water content than that of I. illecebrosus, but its taste is not highly appreciated in Japan. It commands an intermediate price between I. illecebrosus and Ommastrephes bartrami.

Local Names : ARGENTINA: Calmar; JAPAN: Argentina matsuika; URUGUAY: Calmar.

Literature : Okutani (1980); Leto (1981, fishery, Uruguay); Sato & Hatanaka (in press, stock assessment).

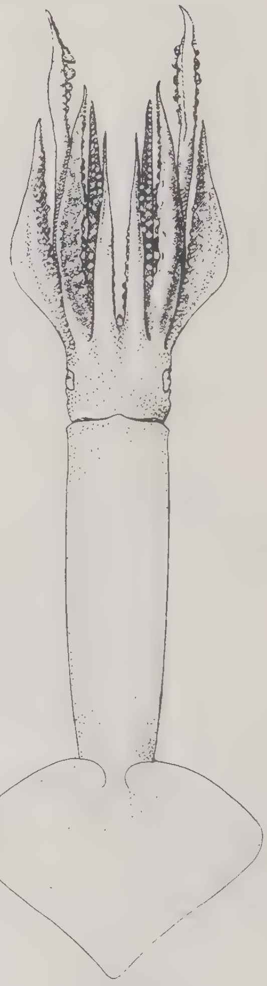
Illex coindetii (Verany, 1839)

Loligo coindetii Verany, 1839, Mem.Reale Accad.Sci.Torino, (2):94.

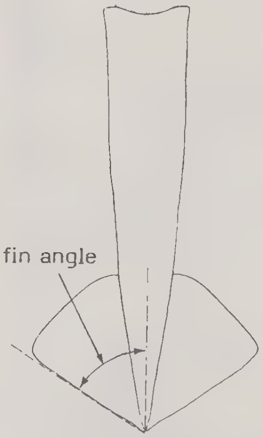
Synonymy : Loligo brogniartii Blainville, 1823; Loligo coindetii Verany, 1839; Loligo pillae Verany, 1851; Loligo sagittata Verany, 1851; Todaropsis veranyi Jatta, 1896; Illex illecebrosus coindeti Pfeffer, 1912.

FAO Names :		
En	-	Broadtail shortfin squid
Fr	-	Encornet rouge
Sp	-	Pota voladora

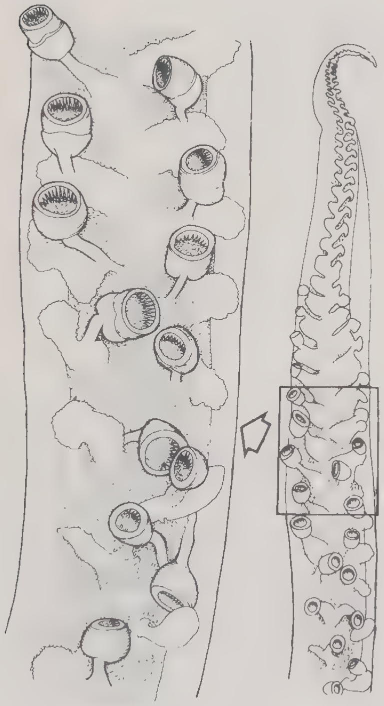
Diagnostic Features : Mantle widest at anterior end (except in fully ripe females), moderately long and narrow; tail pointed, moderately drawn out. Fin angle broad, exceeding 50° (100° in both fins), fin width greater than fin length. Head large and robust, especially in males, length about equal to width; funnel groove without foveola or side pockets. Dactylus of tentacular club with 8 longitudinal rows of small suckers. Arms very long, especially in males where second and third also are very robust; hectocotylized arm (in males) longer than the opposite ventral (IV) arm, its modified portion about 25% of arm length, distal trabeculae modified to papillose, fringed flaps; 1 or 2 knobs on dorsal row of lamellae of modified arm tip.



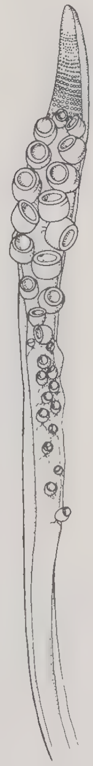
female dorsal view



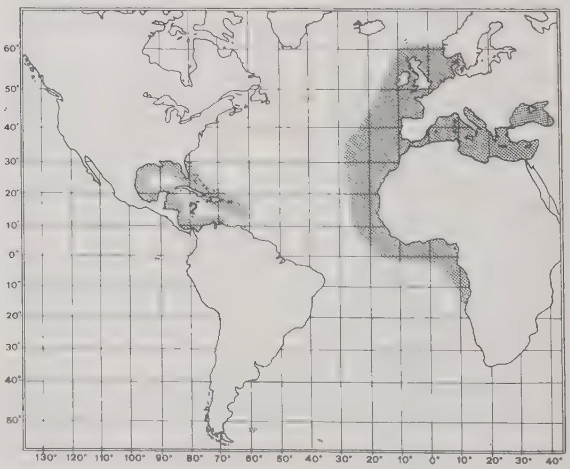
male, ventral view of mantle and fins



arm IV of male hectocotylized



tentacular club



Geographical Distribution : Eastern Atlantic: 15°S to 60°N, Mediterranean and Black Sea. Western Atlantic: Caribbean Sea, Gulf of Mexico and southeast Florida; 10°N to 27°N.

Habitat and Biology : A semidemersal, oceanic and neritic species occurring from the surface to about 1 000 m depth, common in the Caribbean between 180 and 450 m, in the western Atlantic between 200 and 600 m, in the eastern Atlantic between about 150 and 300 m, and in the Mediterranean between 60 and 400 m depth.

The squids are known to carry out diel vertical movements: they are associated with the bottom (usually muddy to silty grounds) during the day and disperse into the water column at night. They also migrate seasonally between deeper waters in winter and shallower waters in the summer. In the western Mediterranean, large mature or maturing individuals migrate towards the coast (from their overwintering areas in 200 to 400 m depth) where, at that time, temperatures tend to be cooler than in greater depths offshore. At an interval of several weeks, they are followed by smaller-sized squids that spend most of spring and summer in shallow waters, while migrating back to offshore areas in autumn. Two peaks can be distinguished during the extended spawning season, one in spring corresponding to the group of large sized individuals and one in autumn corresponding to the smaller sized group. Large females carry up to 12 000 eggs (diameter 1 to 2 mm), the number of eggs being a function of the size of spawners. Individuals hatching in summer usually participate in the autumn spawning in the following year while fall hatchlings tend to spawn in spring of their second year of life, this resulting in an alternation between the two major groups. Post-spawning mortality is high and the lifespan consequently ranges between 1½ and 2 years. The species feeds on euphausid crustaceans and fishes; it is in turn preyed upon by tunas, rays, toothed whales and other larger carnivores.

Size : Maximum mantle length 37 cm in the northern part of its distributional range; 26 cm in females, and 22 cm in males off West Africa. Females grow larger than males. In the Gulf of Guinea, all females larger than 17 cm and males larger than 11.5 cm are mature. In the western Mediterranean, length at first maturity is 18.5 cm in females, and 11 cm in males.

Interest to Fisheries : Taken throughout the year in depths between 100 and 400 m in international bottom trawl fisheries in the western Mediterranean, off West Africa and Spain. Separate statistics are not reported, but it is believed that a sizeable portion of the 1981 catches reported in the FAO Yearbook of Fisheries (FAO, 1983) for Fishing Areas 34 and 37 (23 700 and 39 000 metric tons respectively) under the category "unidentified loliginids and ommastrephids" are attributable to this species.

Local Names : FRANCE: Faux encornet; ITALY: Totano volatore; JAPAN: Taiseiyoitekkususurume, Taiseiyosurume, Yoroppairekkusu; MALTA: Totlu hammari; MOROCCO: Passamas; SPAIN: Volador; USSR: Kalmas.

Literature : Mangold-Wirz (1963, biology, growth, western Mediterranean); Clarke (1966, biology); Fischer (ed., 1973, Species Identification Sheets, Mediterranean and Black Sea, fishing area 37); Zuzuki (1976, bycatch, Gulf of Guinea); Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31); Tomiyama & Hibiya (1978); Okutani (1980); Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part).

Illex illecebrosus (LeSueur, 1821)

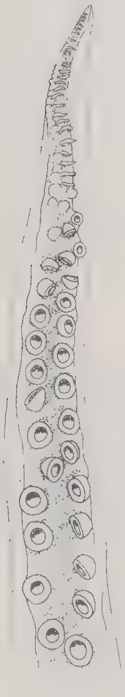
OMMAS III 2

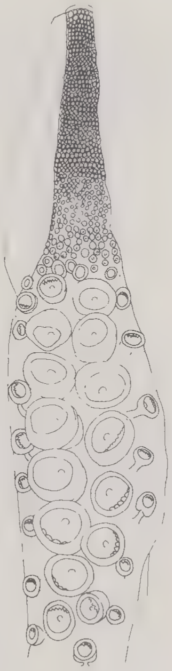
Loligo illecebrosus LeSueur, 1821, J.Acad.Nat.Sci.Phila, 2(1):95.

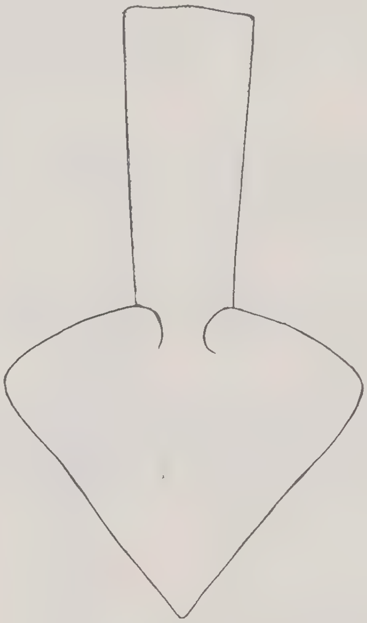
Synonymy : Illex illecebrosus illecebrosus (LeSueur, 1821); Loligo illecebrosus LeSueur, 1821; Loligo piscatorum La Pylaie, 1825; Ommastrephes illecebrosus Verrill, 1880.

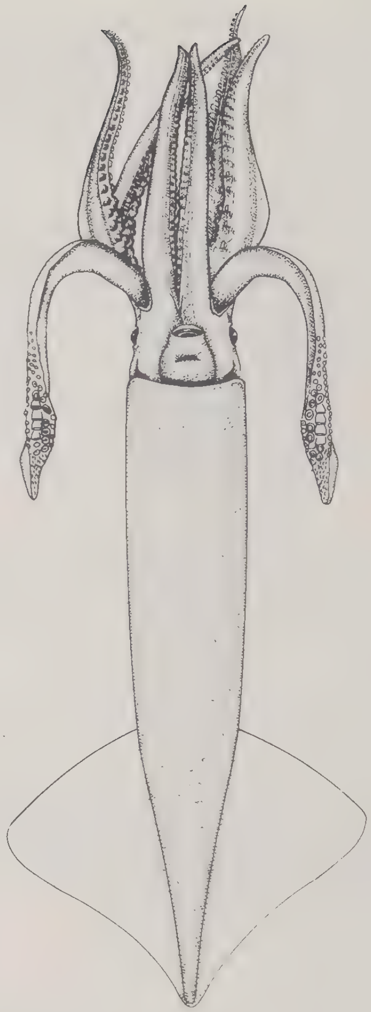
FAO Names : En - Northern shortfin squid
Fr - Encornet rouge nordique
Sp - Pota norteña

Diagnostic Features : Mantle robust, widest at midpoint between anterior end and beginning of fins; tail not sharply pointed. Fin angle moderate, 40° to 50°, mostly 45°; fin width greater than fin length. Head small, short and narrow. Arms relatively short, of about equal length in both sexes; hectocotylized arm (in males) shorter than the opposite ventral arm (IV), its modified portion very short, about 22% of arm length; trabeculae (lamellae) without papillose fringed flaps; 1 or 2 knobs on dorsal row of lamellae on modified arm tip. Colour: reddish-brown to deep purple, more intense on head, arms and dorsal surface of mantle and fins; paler on ventral surfaces; a brilliant yellowish-green tint.

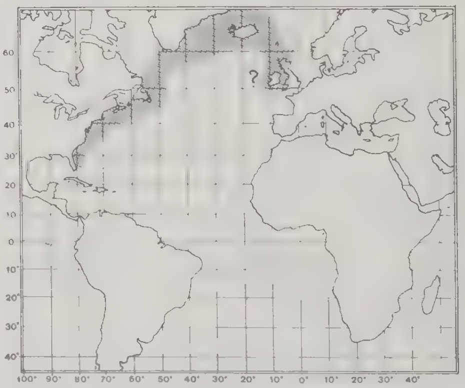

arm IV of male hectocotylized


tentacular club


dorsal view of mantle and fins


ventral view

Geographical Distribution : Western Atlantic: 25°N to 60°N. Northern and eastern Atlantic: British Isles north to Iceland and Greenland.



Habitat and Biology : An oceanic and neritic species, its total depth range extends from the surface to about 1 000 m, but varies seasonally.

In the western Atlantic, seasonal northward - inshore and southward - offshore migrations take place in correlation with environmental conditions, feeding and reproductive cycles. Two groups of spawners one in spring/summer and the other in autumn/winter can be distinguished. Spawning apparently takes place offshore in deeper waters.

Females produce large, spherical, gelatinous egg masses that may reach 1 mm in diameter containing up to 100 000 eggs. Post-spawning mortality is very high. Fertilization of eggs is more efficient at higher temperatures (range 7 to 21°C). Eggs require temperatures between 12 and 22°C for complete development. Hatching occurs after 9, 13 or 16 days at temperatures of 21°, 16°, and 13°C respectively.

Larvae hatching from the winter brood between January and February grow to adult size in little more than 1 year, and spawn after approximately 18 months in summer. Summer hatchlings achieve a mantle length of about 18 or 19 cm after 1 year (females are slightly larger than males) and are ready to spawn in winter at an age of about 1½ years (Mesnil, 1977). Growth rates vary directly with temperature and inversely with size. Small-sized northern shortfin squids feed mainly on euphausids (Meganyctiphanes and Thysanoessa) but switch to finfishes (capelin, herring, and juvenile mackerel) as they grow larger. Squid bites may render unsaleable the finfish part of mixed trawl catches. Squids are in turn preyed upon by cod, adult mackerel, pilot whales and dolphins.

Size : Maximum mantle length 31 cm in females, 27 cm in males in the northern part of its distributional range, but 20 cm in females and 18 cm in males in the southern part.

Interest to Fisheries : This species is almost exclusively fished in the northwestern Atlantic. Catches deteriorated from a 1979 peak of almost 180 000 metric tons to only about 38 000 metric tons in 1981 (FAO, 1983). Two large international fisheries exist: one in the bays of Newfoundland using jigs and jigging machines in depths from 0 to 30 m, and occasionally otter trawls (during summer and early autumn); and an extensive otter trawl fishery along part of eastern Canada and the USA on the shelf and upper slope, and around submarine canyons in depths from 100 to 250 m. Japan and Canada are the two countries taking the greatest share of these catches. The species is in high demand as bait in the autumn cod fishery off Newfoundland because it does not soak and fall off the hooks as fast as finfish bait. Its flesh is also of good food quality although it is high in water content and deteriorates easily. It is therefore processed (but not as salted-fermented 'siokara') or sold immediately fresh. It commands a price approximately 60% of that for Todarodes pacificus.

Local Names : JAPAN: Kanadairekkusu, Taiseiyoirekkususurume, Taiseiyosurume; USA: Northern shortfin squid, Short-finned squid.

Literature : Clarke (1966, biology); O'Dor, Durward & Balch (1977, maintenance in tanks); Mesnil (1977, life history and growth); Testaverde (1977, squid attacks on trawl captured finfish); Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31); Tomiyama & Hibiya (1978); Amaratunga (1980, growth); Durward et al. (1980, reproduction); O'Dor et al. (1980, reproduction); Okutani (1980); O'Dor et al. (1982, effect of temperature on development rates); Lange & Sissenwine (in press, resources).

Illex oxygonius Roper, Lu & Mangold, 1969

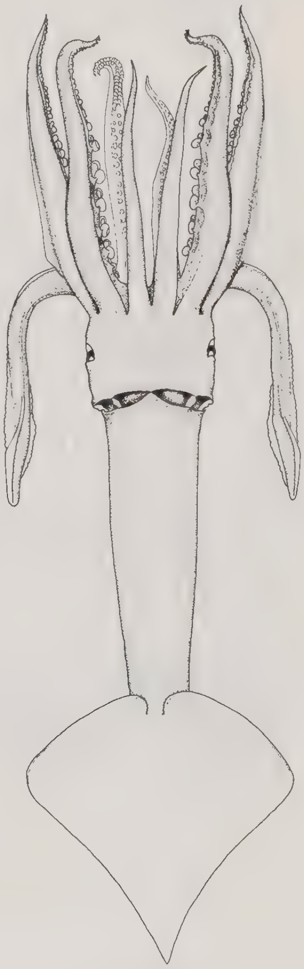
OMMAS Ill 3

Illex oxygonius Roper, Lu & Mangold, 1969, Proc.Biol.Soc.Wash., 82:295.

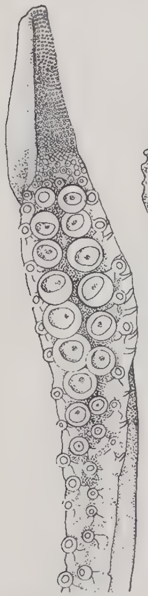
Synonymy : None.

FAO Names :
En - Sharptail shortfin squid
Fr - Encornet rouge à pointe
Sp - Pota puntiaguda

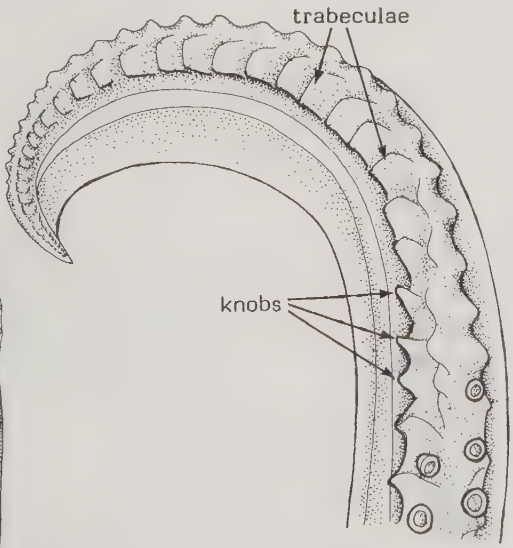
Diagnostic Features : Mantle widest at anterior end; long, narrow, drawn out to a pointed tail posteriorly; males with a sharp, distinct triangular dorsal lobe at mantle opening. Fin angle acute, 25° to 35° (very occasionally to 40° (50° to 80° both fins); fin width equal to or slightly greater than fin length. Head medium-sized, wider than long. Arms moderately long and robust, especially the second and third in males; hectocotylized arm (in males) longer than the opposite ventral arm (IV); modified portion about 29% of arm length; trabeculae (lamellae) without papillose, fringed flaps; 3 knobs on dorsal row of lamellae of modified arm tip.



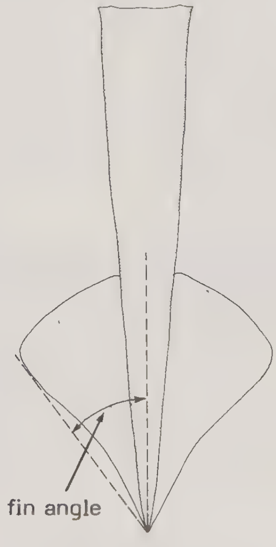
dorsal view



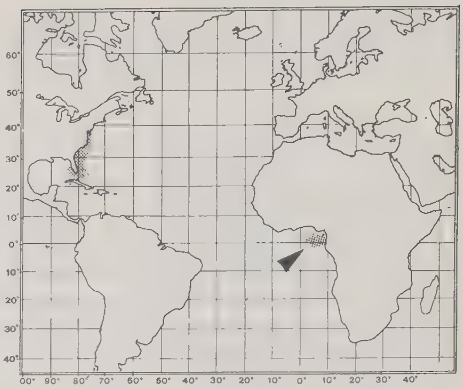
tentacular club



arm IV of male
hectocotylized



ventral view
of mantle and fins



Geographical Distribution : Western Atlantic: Chesapeake Bay to southern Florida and southeastern Gulf of Mexico. Eastern Atlantic: Gulf of Guinea, limits undetermined.

Habitat and Biology : A primarily neritic species occurring in depth between 50 and 550 m within a temperature range from 6° to 13°C. It is associated with the bottom during daylight hours but disperses into the water column at night. Its biology is largely unknown; believed to feed on crustaceans and fishes.

Size : Maximum mantle length 23 cm in males, 21 cm in females.

Interest to Fisheries : At present, the species is only taken as bycath in bottom trawl fisheries; may co-occur with I. illecebrosus.

Local Names : USA: Sharptail shortfin squid.

Literature : Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31).

Todaropsis eblanae (Ball, 1841)

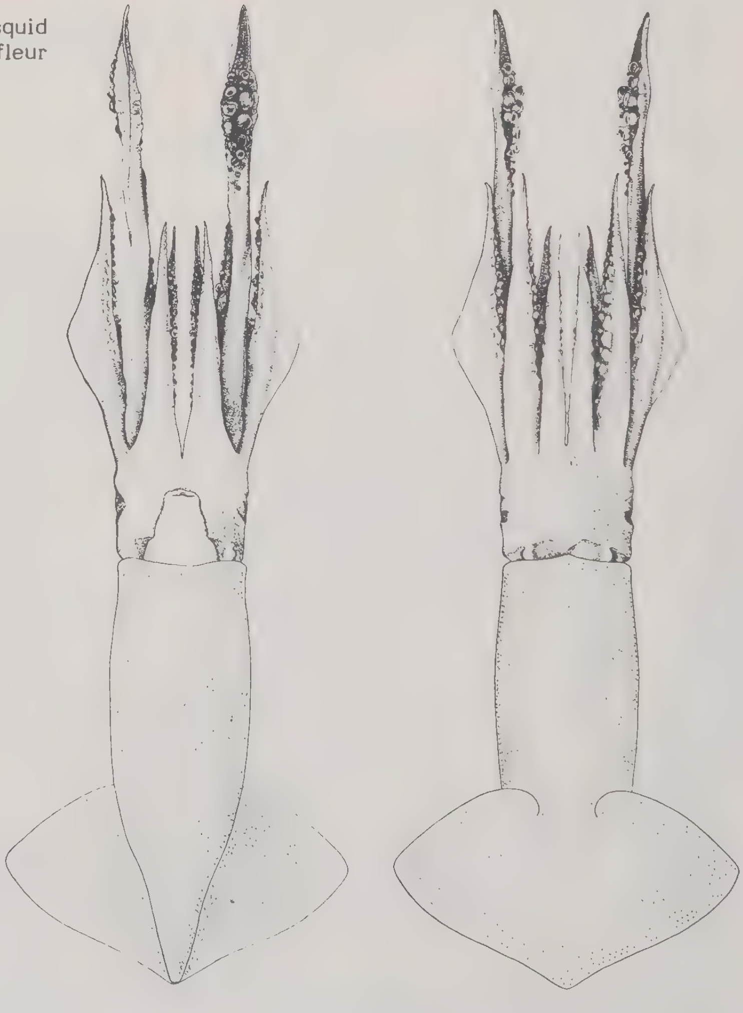
OMMAS Todarop 1

Loligo eblanae Ball, 1841, Proc.Roy.Irish Acad., 19:364.

Synonymy : Loligo eblanae Ball, 1841; Loligo sagittata Verany, 1851; Todaropsis veranyi Girard, 1889; Todaropsis veranii Nobre, 1936.

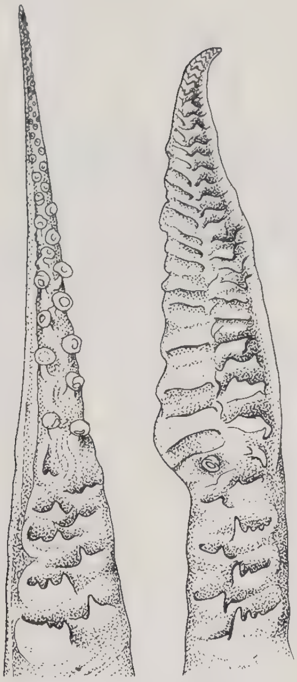
FAO Names :	
En	Lesser flying squid
Fr	Toutenon souffleur
Sp	Pota costera

Diagnostic Features : Fins with anterior border more convex than posterior border; length of fin less than 50% of dorsal mantle length, width of both fins equal to 90% of dorsal mantle length. Head large and broad, 4 nuchal folds on posterior of head; funnel groove without foveola or side pockets. Dactylus of tentacular club with 4 longitudinal rows of small suckers; manus of club with 6 tranverse rows of 4 suckers, each with median pairs up to four times larger in diameter than lateral suckers; sucker rings of largest median suckers with about 30 short, pointed teeth, occasionally alternating with minute teeth. Left and right ventral arms (IV) hectocotylized by modification of suckers into cirrated lappets with transverse lamellae and expanded protective membrane; sucker rings of largest arm suckers with one large pointed median tooth and 3 or 4 smaller pointed teeth.

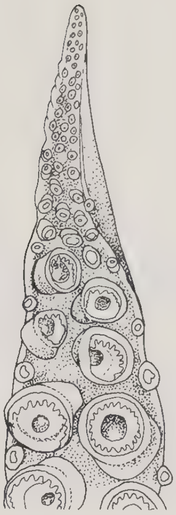


ventral view

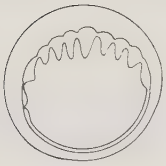
dorsal view



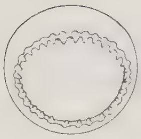
arms IV of male hectocotylized



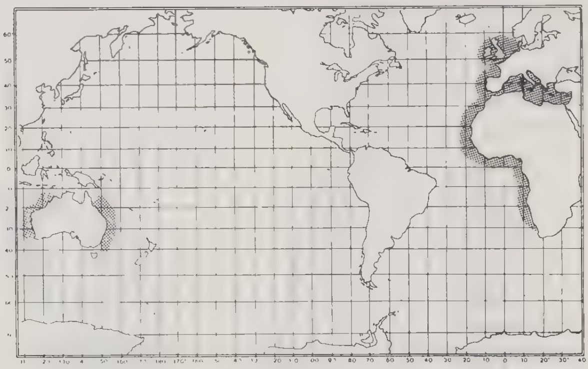
distal end of tentacular club



arm sucker ring



tentacular sucker ring



Geographical Distribution : Very disjunct: Eastern Atlantic: 36°S to 60°N, including around British Isles and Mediterranean Sea; southwest Pacific Ocean off Australia; Southeast Indian Ocean off Australia.

Habitat and Biology : A demersal species, usually associated with sandy to muddy bottoms within a temperature range from 9° to 18°C in depths between about 20 and 700 m (but confined to depths less than 200 m in the North Sea). There is evidence on seasonal migrations. The spawning season seems to be very extended. In the western Mediterranean, mature females (in their second year) are found from March to November, but are more abundant in summer. They carry up to 10 000 eggs (1 to 2 mm in diameter) which are laid in a large egg capsule secreted by the greatly enlarged nidamental glands. Males, which mature within their first year, produce some 200 spermatophores. Predators of this species include albacore (Thunnus alalunga) and sevengill sharks (Heptranchias).

Size : Maximum mantle length 27 cm in females, 16 cm in males; common to 20 cm in females, 13 cm in males. Length at first maturity is about 18 cm in females, 11.5 cm in males.

Interest to Fisheries : Taken as bycatch in otter trawl fisheries, very abundant in some years; catches are usually better in winter. In the western Mediterranean the principal catches are made in depths between 200 and 250 m, while on the Sahara Banks, off northwest Africa, fishing depths range from 100 to 400 m (mostly 200 m). Separate statistics are not reported for this species. Recently reported from Australia.

Local Names : AUSTRALIA: Golden arrow squid.

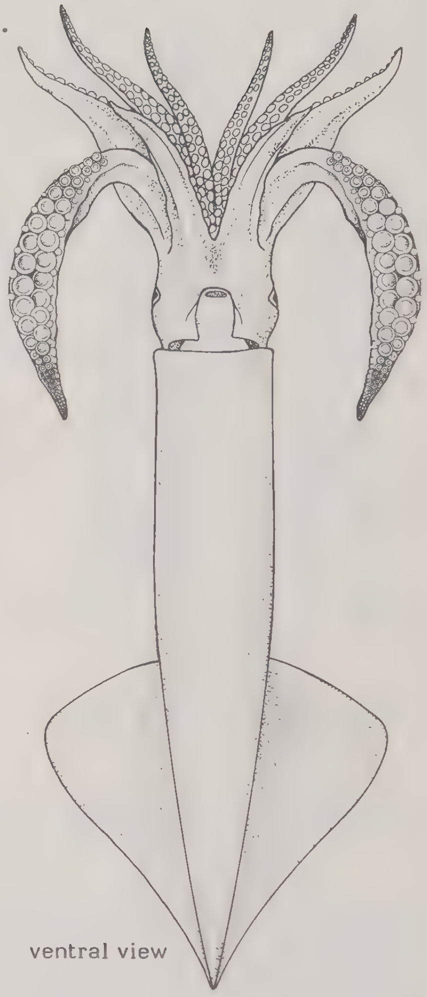
Literature : Mangold-Wirz (1963, biology, western Mediterranean); Clarke (1966, review, biology); Cooper (1979, length-mass relationship); Okutani (1980); Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part); Lu & Dunning (1982, identification, Australia).

Remarks : Recently recorded in Australian waters.

Todarodes filippovae Adam 1975

OMMAS Todarod 2

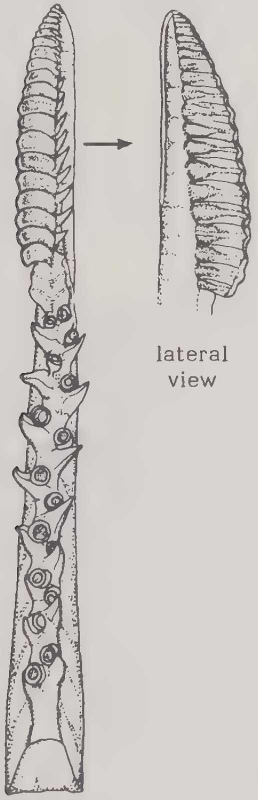
Todarodes fillippovae Adam, 1975, Bull.Inst.Roy.Sci.nat.Belg., 50(9):3.


ventral view

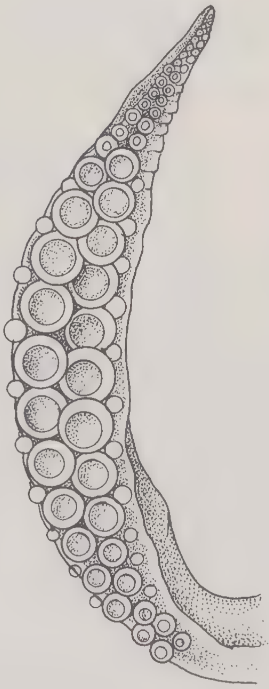
Synonymy : None.

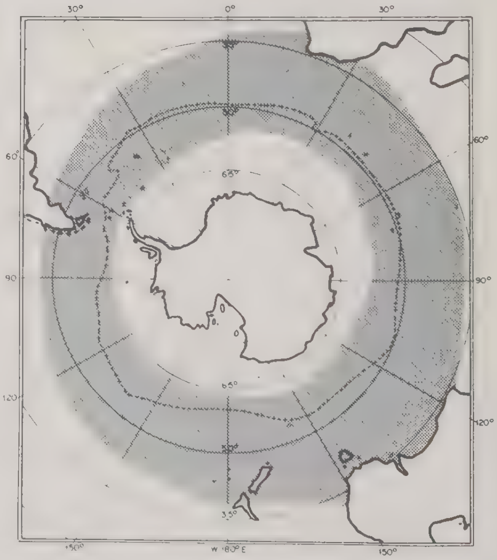
FAO Names :
En - Antarctic flying squid
Fr - Toutenon antarctique
Sp - Jibia antártica

Diagnostic Features : Mantle muscular, long, narrow (width 16 to 24% of mantle length) tapers to a pointed tail. Fins saggittate, length and width about 50% of mantle length; single fin angle about 30^0 to 35^0 (60^0 to 70^0 both fins). Tentacles very large and robust. Clubs very expanded occupying nearly entire length of tentacles; only 2 pairs carpal suckers at base of club; largest manal sucker rings with 8 to 11 sharp teeth alternating with low, flat platelets. Arms relatively short, sucker rings with 10 sharp teeth; right arm IV hectocotylized along distal 21 to 36% of the arm with suckers transformed to papillae and tubercles, with the ventral protective membrane and trabeculae very expansively developed.


lateral view

right arm IV of male hectocotylized


tentacular club



Geographical Distribution : Circum-polar in the Southern Ocean; south of approximately 35^0S; common in the Antarctic Convergence zone.

Habitat and Biology : An oceanic species, occurring between the surface and about 500(?) m depth, but more abundant to about 200 m. Positive phototaxis is strongly developed.

Size : Maximum mantle length over 50 cm; common between 20 and 40 cm.

Interest to Fisheries : Taken as bycatch to the recently developed extensive Japanese jig fishery for Nototodarus sloani off New Zealand and southern Australia; in 1978 it was caught in commercial quantities off northeast Tasmania. Also taken with jigs off the Falkland Islands. The species is believed to have some fishery potential.

Local Names :

Literature : Okutani (1977, fishery potential; 1980); Dunning (1982, fishery potential, Australia); Lu & Dunning (1982, identification, Australia).

Todarodes pacificus (Steenstrup, 1880)

OMMAS Todarod 3

Ommastrephes pacificus Steenstrup, 1880, Danske Viden.Selsk.Forh., 1880:79.

Synonymy : *Ommastrephes pacificus* Steenstrup, 1880; *Ommastrephes sloani pacificus* Sasaki, 1929.

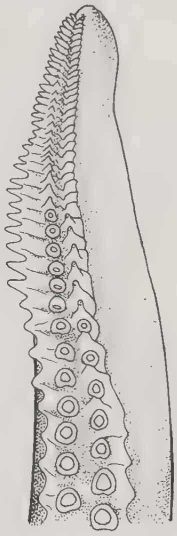
FAO Names : En - Japanese flying squid
Fr - Toutenon japonais
Sp - Pota japonesa

Diagnostic Features : Mantle slender, muscular. Fins sagittate, relatively short, length about 40 to 45% of mantle length. Funnel groove with foveola, no side pockets. Tentacular club expanded, robust, long; median manal sucker rings with sharp, triangular teeth alternating with flat, truncate platelets. Arms relatively short; arm sucker rings smooth proximally, toothed with about 10 to 14 graded, sharp teeth distally; right arm IV hectocotylized in distal third with suckers and stalks modified into low, conical papillae and comb-like protective membrane.

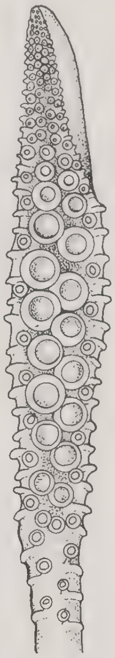
Geographical Distribution : Western Pacific: 20°N to 60°N, excluding the Bering Sea. Northern and eastern Pacific; Japan north and east to Canada (disjunct?).

Habitat and Biology : An oceanic and neritic species occurring within a broad temperature range from about 5° to 27°C, usually in surface waters to 100 m depth and, to a minor extent, down to 500 m depth. During its lifespan of about 1 year a northward migration occurs first, followed by another one in southward direction, usually in close correlation with changes of the main surface currents. Large aggregations occur in small gyres and along oceanic fronts. Three independently breeding subpopulations can be distinguished in Japanese waters. The main group spawns in winter in the East China Sea, the second in autumn, west of Kyushu, and the third, minor group in spring/summer in the Sea of Japan as well as off northeastern Japan. Postspawning mortality is very high.

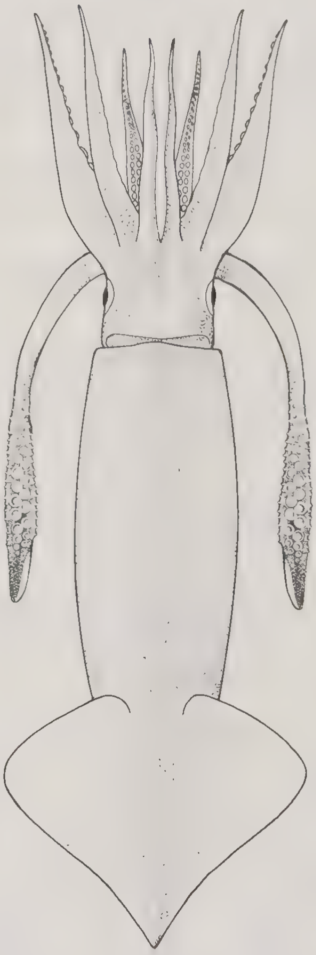
The males of all 3 subpopulations mature before the females and transfer their spermatophores on the still immature females (in water temperatures of 13 to 18°C). With the progressing southward migration, females mature and spawn 300 to 4 000 small, elliptical or semi-spherical eggs (greatest diameter 0.7 to 0.8 mm) embedded in a gelatinous capsule (egg mass). Spawning occurs usually at water temperatures between 15 and 20°C, and, depending on the temperature, the larvae hatch after an incubation period of 102 to 113 hours. Growth rates are directly related with temperature and inversely with size. Main food items are myctophids, anchovies (i.e., *Engraulis japonica*), crustaceans, gastropod larvae, and chaetognaths. Cannibalism is common. Predators include rays, dolphins (*Coryphaena hippurus*), balaen whales, and the northern fur seal.



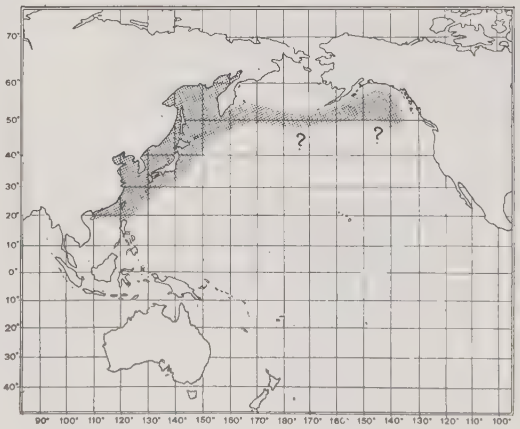
right arm IV of male hectocotylized



tentacular club



dorsal view



Size : Maximum mantle length 50 cm in females, somewhat smaller in males; maximum weight at least 0.5 kg, common 0.1 to 0.3 kg. Females attain sexual maturity at 20 to 25 cm mantle length, males at 17 to 19 cm.

Interest to Fisheries : Well-developed fisheries for this species exist primarily in the northwestern Pacific (Fishing Area 61) around Japan and to a lesser extent off the Korean Peninsula and off China. After a peak of 600 000 tons in 1952, which at that time amounted to 91.5% of the entire Japanese cuttlefish and squid catch, the overall landings declined and have been fluctuating in the last few years between about 200 000 and less than 400 000 tons annually. 1981 catches were down to 230 000 metric tons from 380 000 metric tons in the preceeding year, but they still accounted for about 18% of world cephalopod catches (FAO, 1983). Japan continued to take the lion's share although that of the Republic of Korea steadily increased from approximately 10 to 15% to more than 33% in 1981.

Up to the forties, the Japanese Todarodes pacificus fishery was only a small-scale activity with unpowered boats of 1 to 2 tons, taking less than 100 000 metric tons per year. In the fifties, well equipped, engine-powered boats of 10 to 30 tons were introduced. They deployed more jigging lines as well as battery-powered lamps for light attraction. In the sixties, these boats were in turn substituted by even larger vessels operating with jigging machines and generator-driven lamps, this evolution going hand in hand with the development of improved handling and processing techniques. Furthermore, a 'fishery forecast' has been established for all fishing grounds in the Japan Sea and the western Pacific. Parallel to the decline of catches of T. pacificus, other species such as Ommastrephes bartrami are becoming more heavily exploited.

Initially, T. pacificus was processed into a dried product (surume) for both domestic consumption and export, but with the expansion of the fishery, other production lines evolved, such as raw squid (sashimi), a cooked and processed product (sakiika), frozen, and canned squid.

Local Names : CHINA: Yat boon yau yue (Japanese softfish); JAPAN: Akaika, Ganzeki, Matsuika, Mugiika, Surumeika, Tonkyu.

Literature : Clarke (1966, biology); Okiyama (1965, feeding habits); Hamabe et al. (1975, biology; 1976, fishery resources); Murata et al. (1973, ecology); Araya (1976, migration); Okutani (1977, resources; 1980); Pavlychev & Shevstov (1977, relationship between hydrographical conditions and catchability); Hibiya (1978); Kasahara (1978, jigging and forecasting techniques); Arnold (1979, biology and fisheries).

Todarodes sagittatus angolensis Adam, 1962

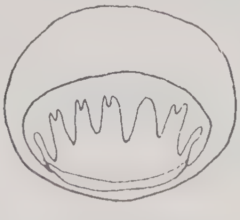
OMMAS Todarod 1a

Todarodes sagittatus angolensis Adam, 1962, Mem.Jun.Invest.Ultr., (2)33:32.

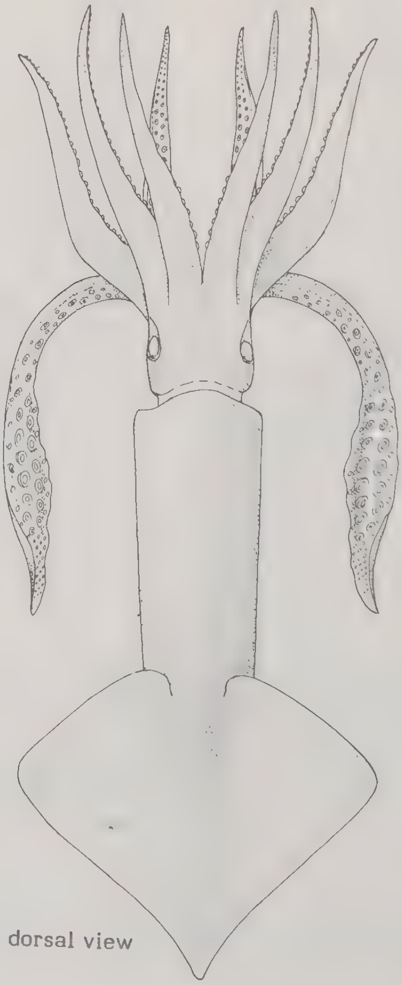
Synonymy : None.

FAO Names :
En - Angola flying squid
Fr - Toutenon angolais
Sp - Pota angolense

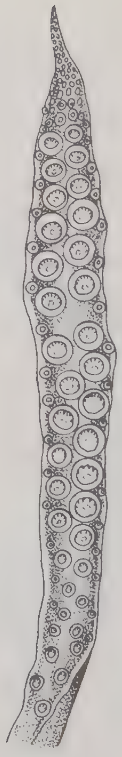
Diagnostic Features : Funnel groove with foveola, no side pockets; no light organs on viscera. Carpal area of club very short with 4 pairs of suckers. Arm sucker rings with large distal teeth alternating with very small teeth; right arm IV of male hectocotylized in distal 40% with suckerless, thick pedicels nearly completely connected by the ventral protective membrane; dorsal row of pedicels flattened.



arm sucker ring



dorsal view



tentacular club

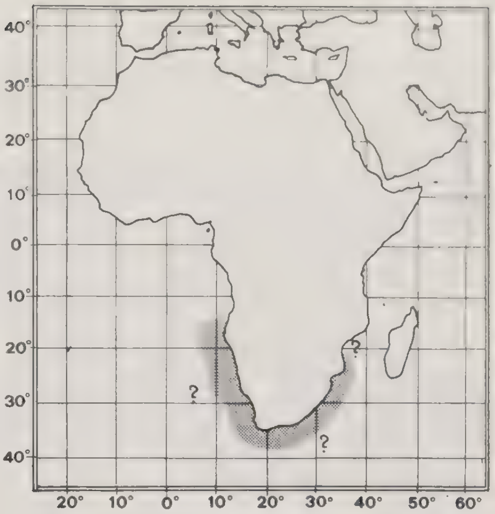
Geographical Distribution : Limited to the eastern Atlantic south of 13°S; occurs around South Africa and reaches into the Indian Ocean; limits unknown.

Habitat and Biology : Unknown.

Size : Maximum mantle length in females 35 cm, in males unknown.

Interest to Fisheries : Currently there is no directed fishery for this species. Caught as bycatch in otter trawl fisheries, but separate statistics are not reported.

Local Names :



Todarodes sagittatus sagittatus (Lamarck, 1798)

OMMAS Todarod 1b

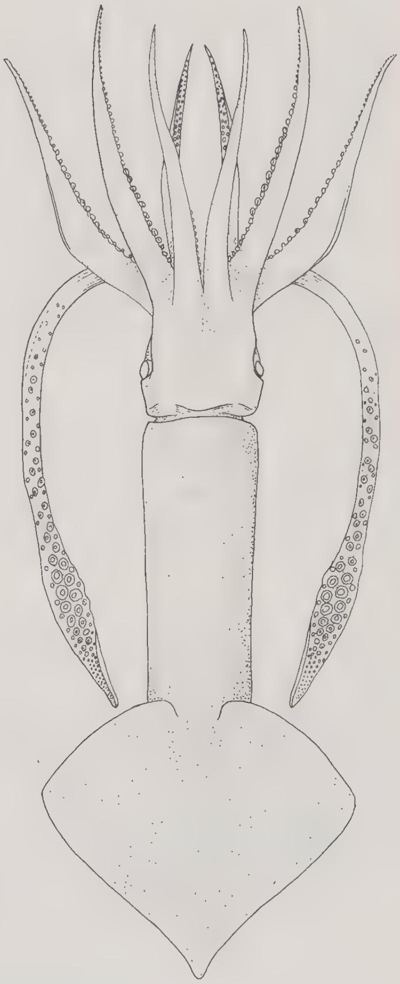
Loligo sagittatus Lamarck, 1798, Mem.Soc.Hist.Nat.Paris, 1:13.

Synonymy : Loligo sagittatus Lamarck, 1798; Ommastrephes sagittatus Lamarck, 1798; Ommatostrephes sagittatus (Lamarck, 1798); Loligo todarus Verany, 1851.

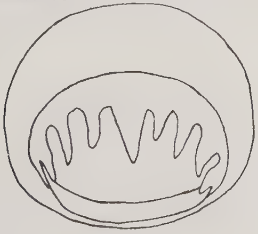
FAO Names :
En - European flying squid
Fr - Toutenon commun
Sp - Pota europea

Diagnostic Features : Funnel groove with foveola and without side pockers. Club suckers on dactylus in 4 rows, suckers on elongate carpus in 10 to 12 pairs; entire club relatively very long, extending along stalk. Arm suckers with enlarged central tooth, 7 to 9 regular teeth and virtually no small alternating teeth. No light organs on viscera.

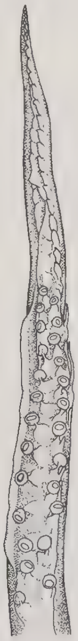
Geographical Distribution : Eastern Atlantic: entire area to approximately 40°W and from 13°S to the Arctic Ocean; Mediterranean Sea.



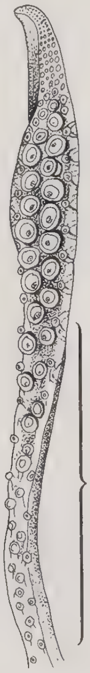
dorsal view



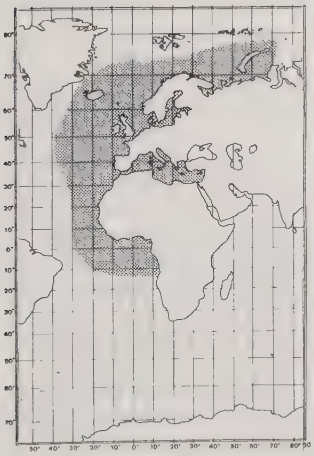
arm sucker ring



arm IV of male hectocotylized



tentacular club



Habitat and Biology : A neritic and oceanic species occurring from the surface to about 1 000 m depth. It is known to carry out diel vertical movements between the surface at night and near bottom waters during the day.

From June onwards, large schools appear off the south and southwest coast and in the northwestern fjords of Iceland, the Faroer Islands, Norway and, in some years, Scotland, where they stay until about December. Stranding of great numbers of squid is relatively common during this period. In early winter, the squids migrate into deeper offshore waters. In the western Mediterranean, no evidence was found for a similar migration pattern, but around Madeira and other parts of the eastern central Atlantic, the species is only found between March and May in large numbers on the fishing grounds.

Spawning probably takes place on the continental slope, in late winter or early spring off northern Europe, in March and April off France, and between September and November in the western Mediterranean. Ripe males seem to be present throughout the year, while mature females are found exclusively during the spawning period. Each female may produce up to about 15 000 eggs. Individuals in the Mediterranean and the southern part of the distributional range mature at sizes much inferior than those in the North Atlantic. Females always greatly outnumber males. Individuals larger than 50 cm are believed to be at least 2 years old.

In northern waters, the species feeds primarily upon small herring (Clupea harengus), and cod (Gadus morhua) and is in turn preyed upon by tunas (Thunnus obesus, T. alalunga), cod, lancetfish (Alepisaurus ferox), dolphins and sperm whales.

Size : Maximum mantle length at least 75 cm; males off northern Europe grow at least to 64 cm; females to 49 cm, while in the Mediterranean the maximum sizes recorded are 32 cm and 37 cm respectively. Common sizes range between 25 and 35 cm.

Interest to Fisheries : A directed fishery for this species exists off Norway where some 10 000 metric tons were taken in 1981 about 3 times as much as in the preceeding year (FAO, 1983). In the Mediterranean, the main fishery is operated by Italian vessels, with annual catches stabilized around 3 000 metric tons in the last few years (FAO, 1983). In other parts of its distributional range, it is taken as bycatch in trawl fisheries. In some Mediterranean countries, the commercial value of this species is relatively high, although the flesh of large individuals is described as tough. It is consumed fresh or boiled; also marketed frozen, salted or dried and used as bait in the cod and halibut fisheries. Apart from large-scale predation on commercial finfish species, it has occasionally been considered a nuisance because of its competition with finfishes for baited hooks.

Local Names : CYPRUS: Thrapsallo; FRANCE: Calmar; GREECE: Kalamari; ITALY: Totano; JAPAN: Hokkaisurumeika, Taiseiyosurume, Yoroppasurumeika; MALTA: Totlu bajdani; MOROCCO: Passamar; SPAIN: Pota; USSR: Kalmar; YUGOSLAVIA: Lignjun.

Literature : Mangold-Wirz (1963, biology, western Mediterranean); Clarke (1966, biology); Fischer (ed., 1973, Species Identification Sheets, Mediterranean and Black Sea, fishing area 37); Tomiyama & Hibiya (1978); Arnold (1979, biology); Okutani (1980); Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part).

Nototodarus gouldi (McCoy, 1888)

OMMAS Noto 1

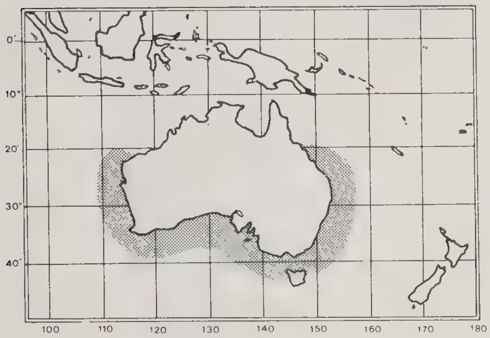
Ommastrephes gouldi McCoy, 1888, Decade, 17:227.

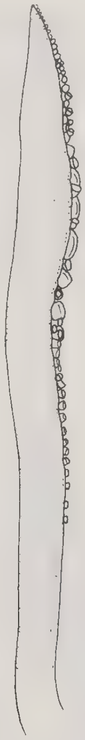
Synonymy : Nototodarus sloani gouldi (McCoy, 1888); Ommastrephes gouldi McCoy, 1888.

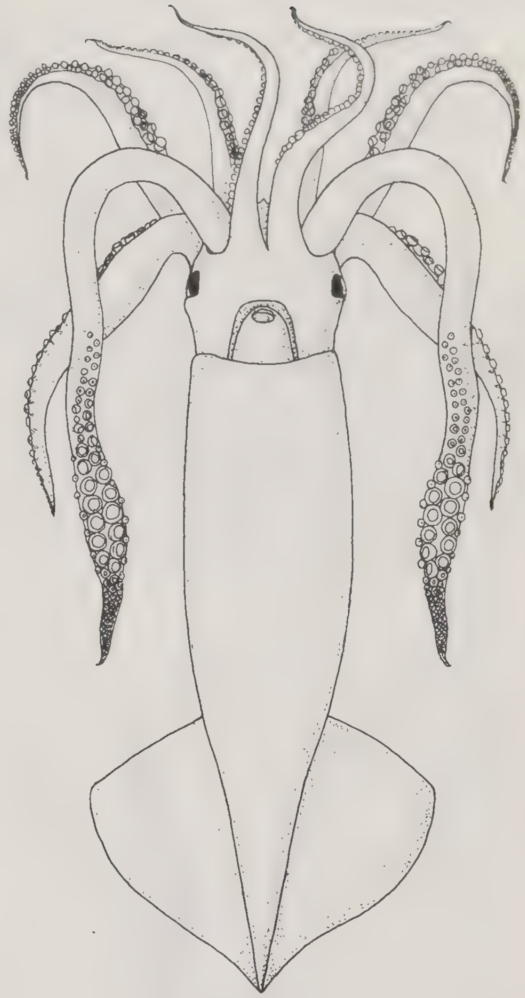
FAO Names :
En - Gould's flying squid
Fr - Encornet éventail
Sp - Pota australiana

Diagnostic Features : Mantle robust, heavily muscled, tapers gradually then very acutely to a point posteriorly. Fins strong, about 45% as long as mantle length; angle broad, 90 to 110° (45 to 55° single fin). Funnel groove with foveola and 6 to 8 low longitudinal ridges apically. Tentacular club long, 60 to 70% of tentacle length; about 8 pairs of enlarged manal suckers in median rows, marginal suckers small, subequal; largest sucker rings toothed all around with 15 separated, stout, triangular, pointed teeth interspersed with low, side platelets. Arm sucker rings with 12 or 13 sharp, triangular teeth graded to a single large central tooth distally; proximal 1/3 smooth, without teeth or denticles; both ventral arms (IV) in males hectocotylized: the right arm with a heavily tuberculate basal region, a narrow sucker-bearing mid-part, and a distal part with very broadly expanded, pectinate protective membrane; the left ventral arm 1/4 longer than right IV, with 5 proximal-most pairs of suckers modified into large, swollen tubercles.

Geographical Distribution : Temperate to subtropical areas off Australia.




tentacular club


ventral view

Habitat and Biology : A neritic and oceanic, mostly epipelagic species occurring from the surface to about 500 m depth. Its abundance in surface waters is correlated with the lunar cycle; in full moon nights the squids tend to remain in deeper waters where they are less vulnerable to the fishing gear. Individuals in all maturity stages are encountered throughout the year, but at least one major spawning season, from February to March can be identified. Large aggregations are formed in this period. Individuals ready to spawn seem to stay close to the bottom. Hectocotylization of both ventral arms in males starts at a minimum size of about 14 cm. Males usually outnumber females.

The species feeds predominantly on ommastrephid squids (with a high rate of cannibalism) and fishes (primarily pilchards). It is in turn preyed upon by tunas and other large carnivores.

Size : Maximum mantle length 40 cm in females, 35 cm in males; weight about 0.8 kg. Females grow larger than males, but males tend to be heavier at a given length.

Interest to Fisheries : Initially, the species was only taken as bycatch in the Australian prawn fishery. Feasibility fishing started in summer 1978/1979, with 19 Japanese jiggers operating in southeast Australian waters. In the light of promising catch rates, exploratory fishing was subsequently expanded. Chinese jigging vessels (from Taiwan) operate intermittently in the area. Catches are best in the waters around Tasmania and the western Bass Straits, particularly from December to March. In recent years, the annual catch fluctuated between 4 000 and 5 000 metric tons (Dunning, 1982).

Local Names : AUSTRALIA: Gould's squid.

Literature : Machida (1980, squid survey); Dunning (1982, fishery resources); Smith (1983, biology and fishery); Chikuni (in press, resources).

Nototodarus hawaiiensis (Berry, 1912)

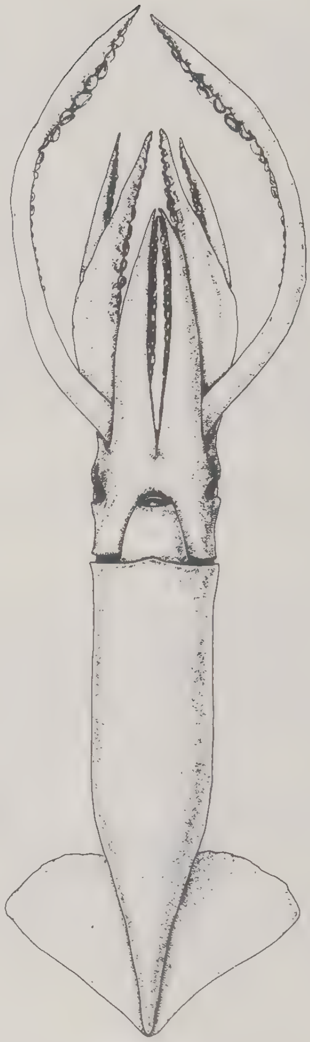
OMMAS Noto 2

Ommastrephes hawaiiensis Berry, 1912, Proc.Acad.Nat.Sci.Phila., 64(2):434.

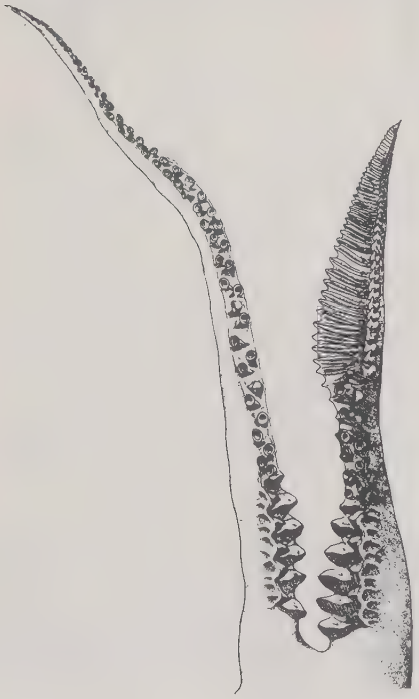
Synonymy : Ommastrephes hawaiiensis Berry, 1912; Nototodarus sloani hawaiiensis (Berry, 1912).

FAO Names :	
En	Hawaiian flying squid
Fr	Encornet bouquet
Sp	Pota hawaiana

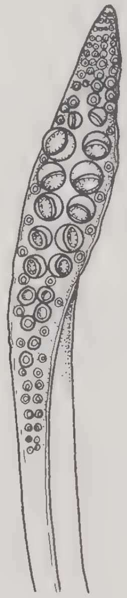
Diagnostic Features : Mantle cylindrical, muscular, tapering to a conical tip. Fins muscular, length 38 to 40% of mantle length, single fin angle 54^{0} (50 to 57^{0}). Funnel groove with foveola, no longitudinal ridges. Tentacular club, especially carpal area, occupies most of tentacle length (about 70%); largest median sucker rings with 15 or 16 large, conical, pointed teeth with low, truncated platelets between each tooth; distal, central tooth quite enlarged. Arm sucker rings toothed all around with 19 to 21 small, conical (distally) to rounded (proximally) teeth; distal, central tooth quite enlarged; small denticles between some distal teeth; both arms IV hectocotylized in males, right especially so - longer and larger than left; proximal 1/4 of each have enlarged trabeculae and thickened protective membranes; distal right arm trabeculae, sucker stalks and suckers modified by enlargements, reductions, etc.



ventral view



arms IV of male hectocotylized

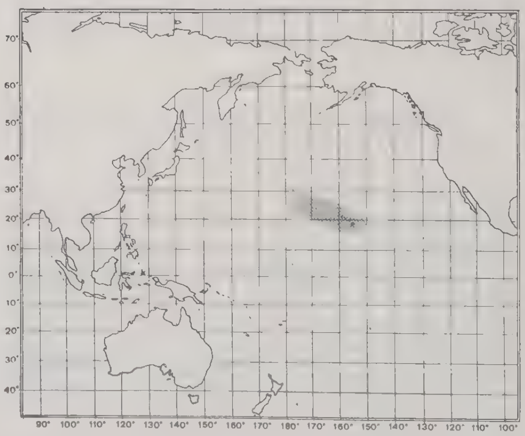


tentacular club

Geographical Distribution : Central Pacific Ocean: Hawaiian Islands to Midway Island.

Habitat and Biology : A demersal species taken in open nets fishing down to depths between 400 and 570 m, but it probably occurs also in shallower waters because it is an important food item in the diet of sea birds and fishes. Its biology is little known.

Size : Maximum mantle length 16 cm; males and females mature at 11 or 12 cm mantle length.



Interest to Fisheries : An artisanal fishery exists off Hawaii (Big Island) out of the Port of Hilo. Exploratory fishing with jigs and gillnets is in progress and the species is believed to have sufficient potential for an expansion of the fishery. Used for human consumption and as bait.

Local Names :

Nototodarus philippinensis Voss, 1962

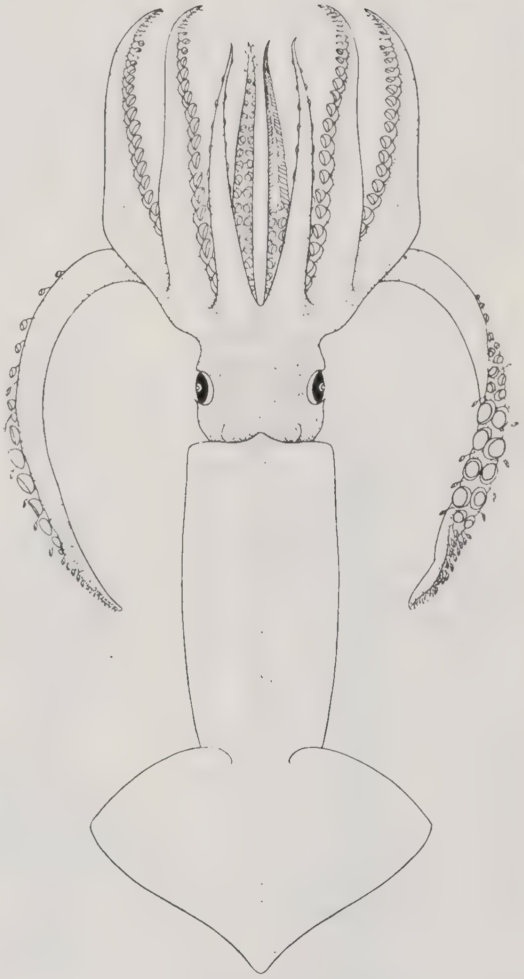
OMMAS Noto 3

Nototodarus sloani philippinensis Voss, 1962, Proc.Biol.Soc.Wash., 75:171.

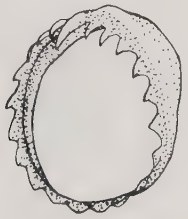
Synonymy : Nototodarus sloani philippinensis Voss, 1962

FAO Names :
En - Philippine flying squid
Fr - Encornet fuiripin
Sp - Pota filipina

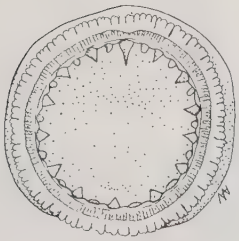
Diagnostic Features : Mantle thick, muscular, tapering to a narrow, pointed tip posteriorly. Fins muscular, broad, short, length about 50% of mantle length; a dark stripe of thickly set chromatophores along dorsal midline. Funnel groove with foveola and longitudinal ridges. Tentacular club occupies about 3/4 of tentacle; carpal area indistinct; about 12 median manal suckers 3 or 4 times larger than marginal suckers, with 14 to 18 large, sharp teeth, the central one enlarged. Arms large, robust; largest arm sucker rings with about 20 teeth all around; proximally, teeth are flattened broad platelets that grade distally into sharp, pointed teeth, the distal central tooth much enlarged, pointed and curved; both arms IV in males hectocotylized basally by protective membranes and trabeculae modified into thick, saw-like processes; right arm further modified to tip by greatly reduced suckers and stalks enlarged, closely set, comblike.



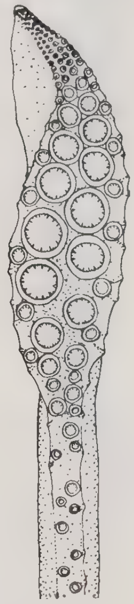
dorsal view



arm sucker ring

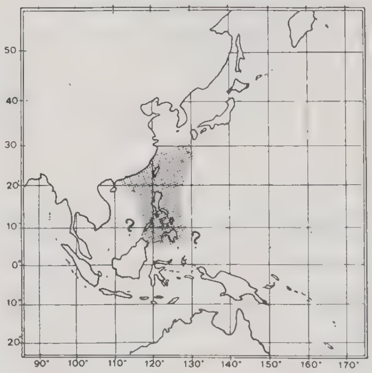


tentacular ring



tentacular club

Geographical Distribution : South China Sea: Philippines, Hong Kong; limits undetermined.



Habitat and Biology : A demersal species in depths of 275 to 650 m.

Size : Maximum mantle length 18 cm, weight 0.2 kg.

Interest to Fisheries : Apparently very common, believed to have a high fishery potential because of its abundance and the consistency of the muscle which makes it fit for human consumption. Its occurrence in relatively deep waters may limit access by common trawling techniques.

Local Names : JAPAN: Fuiripinsurumeika.

Nototodarus sloani (Gray, 1849)

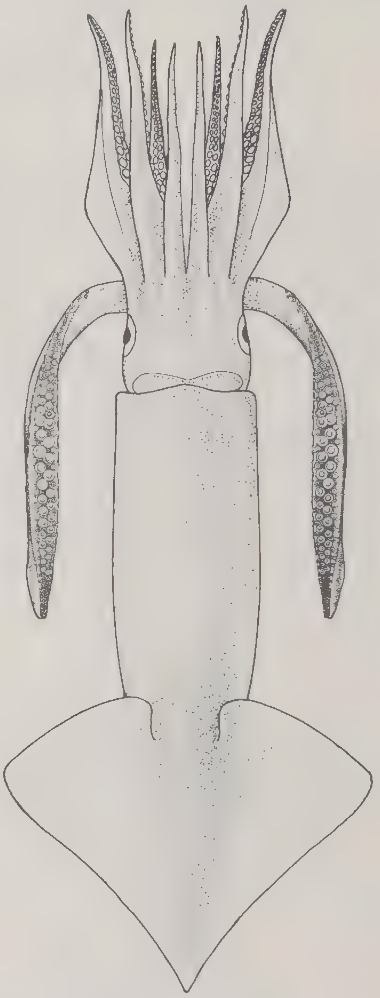
OMMAS Noto 4

Ommastrephes sloani Gray, 1849, Cat.Moll.Brit.Mus., 61.

Synonymy : Notodarus sloani sloani (Gray, 1849); Ommastrephes sloani Gray, 1849; Nototodarus insignis Pfeffer, 1912.

FAO Names :
En - Wellington flying squid
Fr - Encornet minami
Sp - Pota neozelandesa

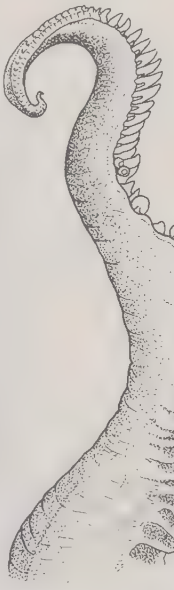
Diagnostic Features : Mantle muscular tapers to pointed tail. Fins broad, sagittate length 42 to 48% of mantle length; single fin angle 44° (40 to 50°). Funnel groove with foveola and 10 to 13 longitudinal ridges. Tentacular club occupies much of tentacle length; protective membranes very low, weak; largest sucker rings with 11 to 13 conical teeth all around interspersed with low truncated platelets; distal central tooth not enlarged. Arm sucker rings smooth proximally, grading to truncate teeth laterally and about 11 to 15, short, triangular teeth distally, the central one enlarged; both arms IV in males hectocotylized basally with modification of protective membranes and trabeculae into large, ridged, saw-tooth processes; suckers absent; stalks remnants only; right arm IV distally with sucker stalks enlarged, comb-like, conical; suckers and trabeculae lost.



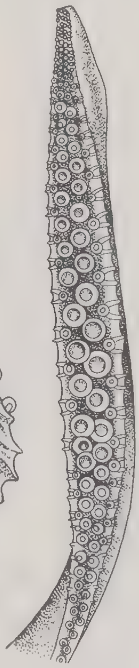
dorsal view

Geographical Distribution : Limited to New Zealand waters.

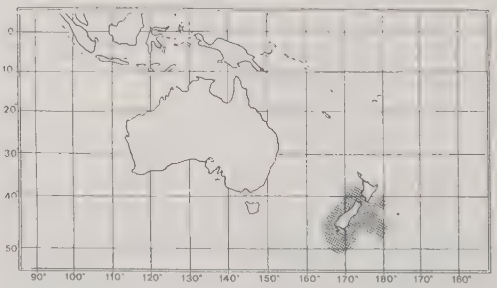
Habitat and Biology : A neritic and oceanic species occurring from the surface to about 500 m depth, occasionally forming large aggregations down to 300 m. It occurs over a broad range of temperatures but seems to be either more abundant or more vulnerable in colder waters. Two groups, possibly species, are distinguished by morphometric features, one north of the subtropical convergence zone and one within or south of the convergence. Within the northern group clearly identified as N. sloani, the western population occurs in an upwelling area and grows to larger sizes than the eastern population. The group south of the convergence has a growth pattern similar to that of the northwestern population. Growth rates vary inversely with size and directly with temperature (Roberts, 1983). The lifespan of this species exceeds one year. Each of the two northern populations has 2 peak spawning season: autumn (March and April) and spring (September to November) for the northwestern population, and July and December for the northeastern population.



arm IV of male hectocotylized



tentacular club



Size : Maximum mantle length about 42 cm, maximum weight 1.8 kg in western New Zealand, but 32 cm and 0.6 kg in the warmer waters of northeastern New Zealand.

Interest to Fisheries : Apart from the exceptionally good landings in 1980 (63 000 metric tons reported from Japan (more than 90% of the total catch) and the Republic of Korea), annual catches of this species averaged about 29 000 metric tons in recent years (FAO, 1983). Japanese and South Korean jigging vessels, operating under joint-venture schemes with New Zealand, take about half the catches, but they land only a fraction in this country. This squid is also taken in trawling operations of foreign licensed vessels from USSR, Japan and the Republic of Korea. The fishery is regulated through a quota system. The quotas for the 1981/1982 trawling season for all fishing grounds were allocated as follows: Republic of Korea: 1 600 tons, Japan: 9 900 tons, USSR: 11 500 tons, and joint venture operations 27 000 tons (Mattlin, 1982). So far, only the western and southern groups of N. sloani are being exploited. The vessels usually operate during a 90 to 120 day fishing season extending from December to April.

Frozen and processed squids are exported to various countries. Domestically caught squid are marketed fresh or processed.

Local Names : JAPAN: Minamisurumeika, Nyujirando - minamisurumeika, Nyujirandosurumeika; NEW ZEALAND: New Zealand arrow squid.

Literature : Roberts (1978, New Zealand squid resources; 1983, biology and fishery); Kawakami & Okutani (1981, identity); Mattlin (1982, fishery).

Remarks : Two species of Nototodarus are now believed to exist in New Zealand, a southern form and a western and northeastern form, but their nomenclature has not been clarified or published.

Ommastrephes bartrami (LeSueur, 1821)

OMMAS Ommas 2

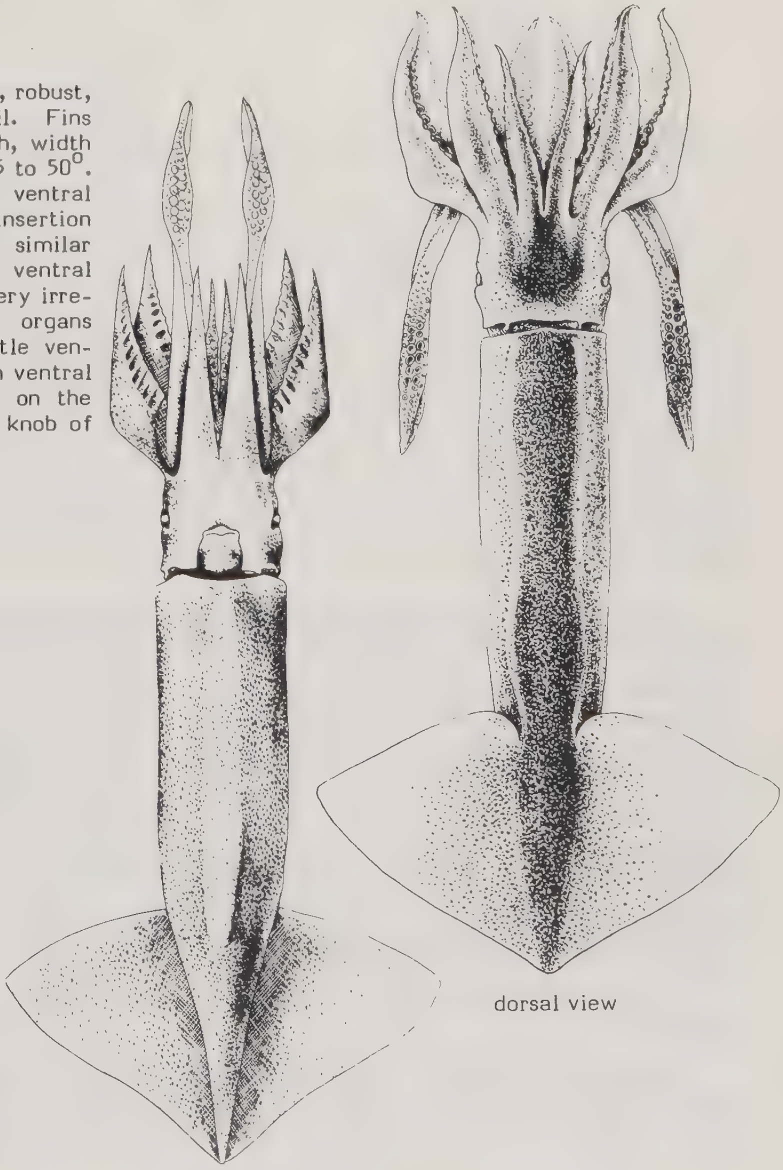
Loligo bartrami LeSueur, 1821, J.Acad.Nat.Sci.Phila., 2(1):90.

Synonymy : Loligo bartrami LeSueur, 1821; Sthenoteuthis bartrami - invalid generic name.

FAO Names :

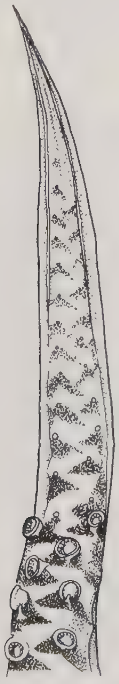
En	Neon flying squid
Fr	Encornet volant
Sp	Pota saltadora

Diagnostic Features : Mantle muscular, robust, not drawn out posteriorly into a pointed tail. Fins muscular, length 40 to 45% of mantle length, width about 60% of mantle length, single fin angle 45 to 50^o. A long golden or silvery stripe along the ventral midline from mantle opening to level of fin-insertion (this stripe probably is a luminescent organ); similar golden tissue on ventral surfaces of head and ventral arms (IV); numerous closely-packed, small, very irregularly shaped, often interconnected, light organs embedded under the skin in muscle of mantle ventrally; similar light organs occur in patches on ventral surface to head. Four to six small suckers on the tentacular stalk proximal to the first smooth knob of the fixing apparatus.

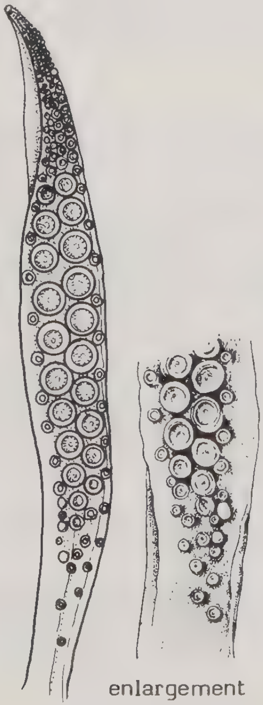


ventral view

dorsal view

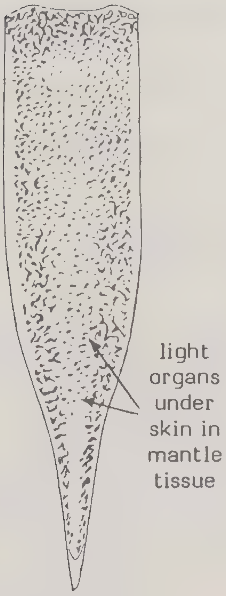


arms IV of male hectocotylized

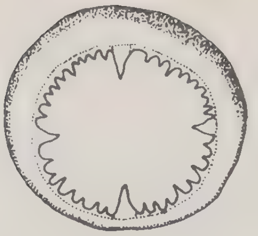


enlargement of base

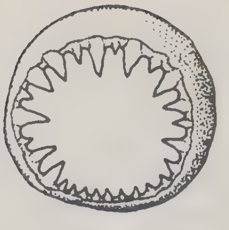
tentacular club



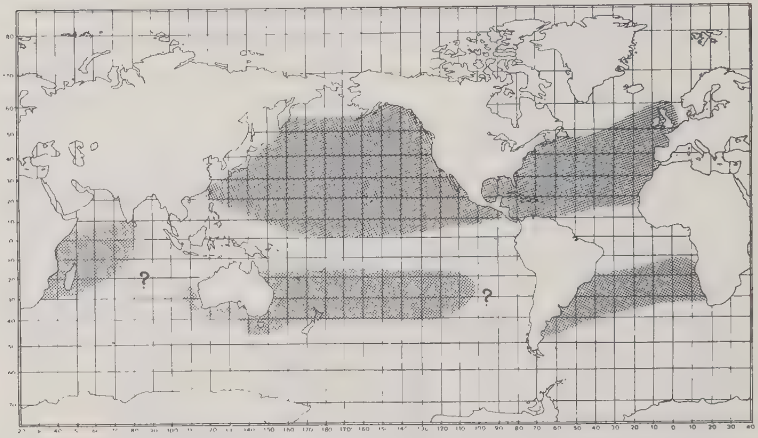
ventral view



tentacular club sucker ring



arm sucker ring



Geographical Distribution : Worldwide in subtropical and temperate oceanic waters, but distribution discontinuous (apparently non-tropical, absent in equatorial waters).

Habitat and Biology : An oceanic species occurring from the surface to approximately 1 500 m depth. In the northwestern Pacific, population densities are highest in the boundary zone between warm and cold waters, particularly from July to August (water temperature gradient 15 to 24°C) and from end of September to December (10 to 22°C). This species avoids waters of less than 10°C. It carries out seasonal migrations. Throughout summer and fall, dense schools are encountered associated with the movements of the Kuroshio current, feeding in surface waters, which migrate to deeper waters and disperse during winter and spring. During the feeding season, diurnal vertical migrations have been observed between nearsurface waters at night and deeper layers in daytime. From July through October most individuals are immature; both sexes mature between January and April, the males about 3 months earlier than the females. The spawning season is rather extended (January to May off Japan) and hence it is possible to distinguish a "fast"-growing and a "slow"-growing group, depending on the environmental conditions at hatching and in the initial juveniles stages. Growth rates are directly correlated with temperature and inversely with size. The lifespan is about 1 year. Food of flying squid consists predominantly of fishes, such as lanternfishes, sardines, mackerel larvae, and sauries. Other squids account for up to 30% of the stomach contents, including a high percentage of cannibalism, while pelagic crustaceans form a highly variable, but usually minor fraction (particularly in adult squids).

Size : Maximum mantle length 50 cm in females; males somewhat smaller; maximum weight 1.8 kg. Off Japan, females mature at little less than 40 cm, males between 29 and 32 cm.

Interest to Fisheries : With the decline of the stocks of Todarodes pacificus, the effort of the Japanese squid fishery has been increasingly shifting towards the exploitation of flying squid, and since 1974 catch and effort levels for this species have gone beyond the exploratory fishing stage. Landings increased from 17 000 tons in 1974 to about 150 000 tons in 1978 and 187 000 tons in 1980, primarily as a result of the eastward expansion of the fishing grounds. An annual 'fishery forecast' is prepared in Japan for the fishing grounds in the Japan Sea and the Pacific. During its northward migration in early summer, the species is fished off northeastern Honshu, between the surface and about 150 m depth with jigging machines, while in the Tasman Sea, off New Zealand and in the North Pacific, it is caught with drift gillnets. Although it is abundant in other oceans, there are currently no fisheries directed at this species outside the Pacific. The current level of exploitation is suspected to exceed the optimum sustainable yield. The flesh is of good quality for human consumption, although somewhat tough in mature individuals. It is marketed fresh and frozen.

Local Names : AUSTRALIA: Red ocean squid; JAPAN: Akaika, Bakaika, Medama, Murasakiika; USA: Neon flying squid.

Literature : Ishi (1977, growth, northwestern Pacific); Murata & Ishi (1977, biology, northwestern Pacific); Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part).

Ommastrephes caroli (Furtado, 1887)

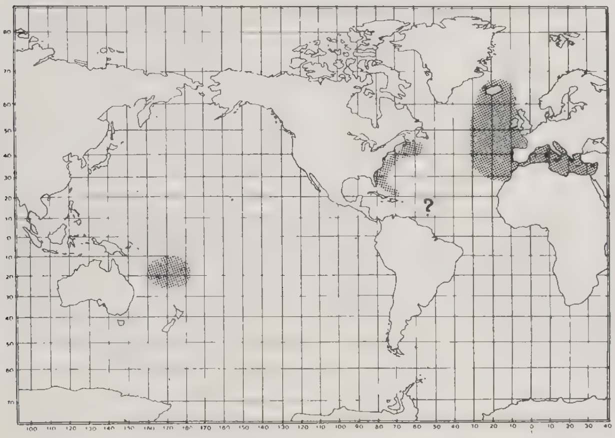
Ommatostrephes caroli Furtado, 1887, Mem.Acad.Sci.Lisboa, 6:5.

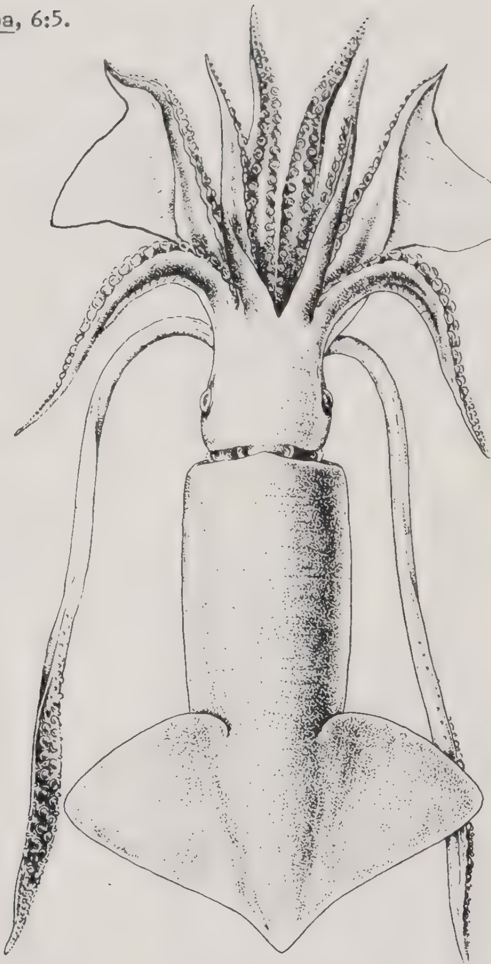
Synonymy : Ommatostrephes caroli Furtado, 1887.

FAO Names : En - Webbed flying squid
Fr - Encornet carol
Sp - Pota velera

Diagnostic Features : A large squid. Mantle very muscular, robust. Fins large, muscular, broad, width about 90% of mantle length, length about 45 to 50% of mantle length; fin angle broad, single fin angle 60 to 65°; ventral protective membrane on arm III of adults very greatly enlarged into a broad triangular web.

Geographical Distribution : Northeastern Atlantic (excluding the North Sea), Mediterranean Sea; western North Atlantic, southwestern Pacific.





dorsal view

Habitat and Biology : An oceanic species occurring between the surface and 1 500 m depth and carrying out diel vertical movements (near the surface at night and in deeper waters in daytime). It is also known to migrate seasonally in relation to the temperature conditions of the water bodies in the northeastern Atlantic. By about July, small individuals of both sexes appear in Madeiran waters where they form numerous schools of up to 50 similar-sized individuals. These schools become smaller as the individuals grow in size.

Spawning takes place in late summer and autumn. A large female may carry up to about 360 000 eggs. The species feeds on fishes and other squids. Cannibalism is common. It is in turn preyed upon by tunas, cod and other finfishes.

Size : Maximum mantle length 70 cm in females, somewhat smaller in males. Length at first maturity is about 40 cm in females, 30 cm in males.

Interest to Fisheries : In Madeira, the species is locally fished for human consumption and bait. It is believed to have some potential for an expanded fishery. Its size and muscular consistency appear most desirable.

Local Names : USA: Webbed flying squid.

Literature : Clarke (1966, biology).

Remarks : The larval stage sometimes referred to as Rhynchoteuthis and is easily confused with O. pteropus.

Ommastrephes pteropus Steenstrup, 1855

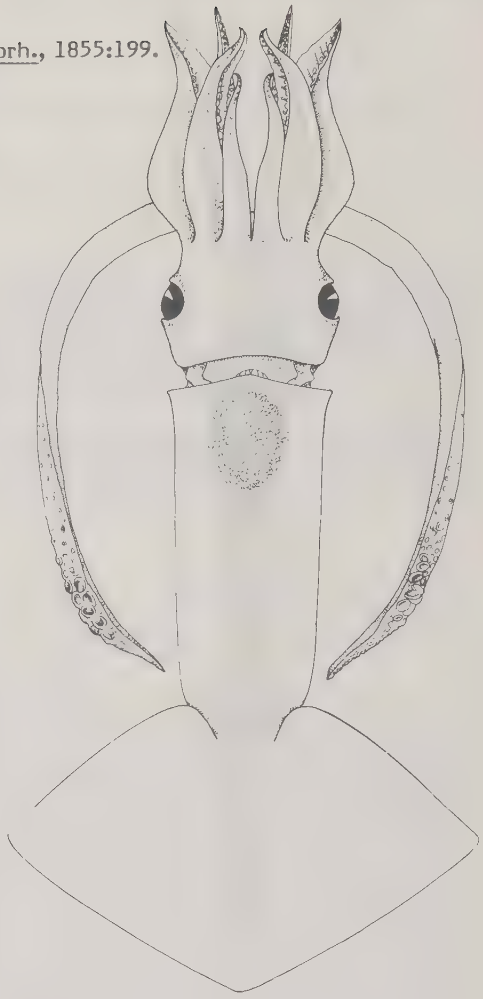
OMMAS Ommas 3

Ommastrephes pteropus Steenstrup, 1855, Over.Danske Vidensk.Forh., 1855:199.

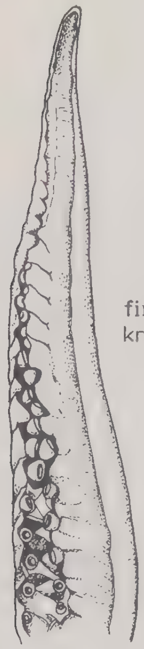
Synonymy : Ommastostrephes pteropus - invalid generic name.

FAO Names :
En - Orangeback flying squid
Fr - Encornet dos orange
Sp - Pota naranja

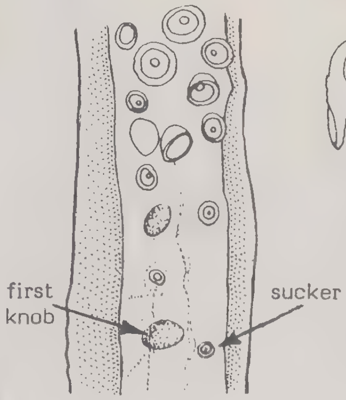
Diagnostic Features : Mantle muscular, robust, not drawn out posteriorly into a pointed tail. Fins muscular, length 45 to 50% of mantle length, width 75 to 80% of mantle length; single fin angle 55 to 60°. A large, oval patch on the antero-dorsal part of the mantle just beneath the skin consisting of numerous densely packed, small light organs; small, individual scattered light organs (like short grains of rice) embedded in muscle of ventral surface of mantle, head and arms IV. Zero to 2 small suckers on the tentacular stalk proximal to the first smooth knob of the fixing apparatus.



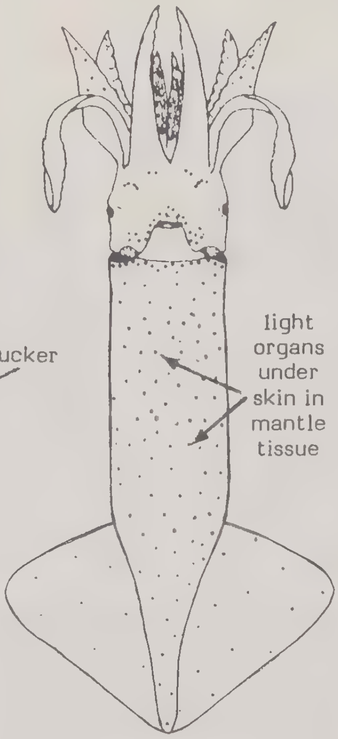
dorsal view



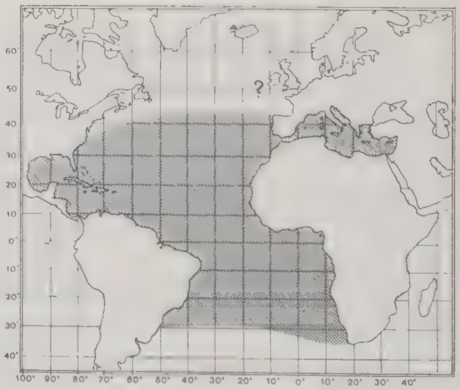
arms IV of male hectocotylized



base of tentacular club


light organs under skin in mantle tissue

ventral view



Geographical Distribution : Pan-Atlantic in tropical and warm-temperate waters; limits of distribution unknown; the 25°C surface isotherm has been suggested as the southern limit, the 22°C surface isotherm as the northern limit.

Habitat and Biology : An oceanic species occurring from the surface to about 1 500 m depth, known to carry out diel vertical movements between the surface at night and deeper waters in daytime. During periods of bright moonlight or rough seas, however, it does not appear at the surface.

Every year, around August, schools of maturing females (hardly any males) migrate northward into Madeiran waters in coincidence with the shifting of the 22°C surface isotherm, which seems to determine the northern range limit of the species. The size of schools decreases as individuals grow in size. Spawning areas are unknown; the eggs are laid in large, gelatinous, sausage-shaped masses that float at or near the water surface and contain up to several hundred thousand embryos.

The species is an active predator on fishes, crustaceans and squids. Cannibalism is common. It is in turn preyed upon by tunas, billfishes, cod and other finfishes.

Size : Maximum mantle length 40 cm in females, males somewhat smaller; length at first maturity about 30 cm in females.

Interest to Fisheries : Around Madeira this species is locally dipnetted or jigged at night, and utilized for human consumption. It is believed to be very abundant, although no assessment of the actual population size has been made. It may have sufficient potential to also support a fishery in the Caribbean. The flesh is of excellent quality, and hence, well suited for human consumption, either fresh or frozen.

Local Names : COLOMBIA, CUBA, MEXICO: Lomo anaranjado; USA: Orangeback flying squid; VENEZUELA: Lomo anaranjado.

Literature : Clarke (1966, biology); Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31); Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part).

Symplectoteuthis luminosa Sasaki, 1915

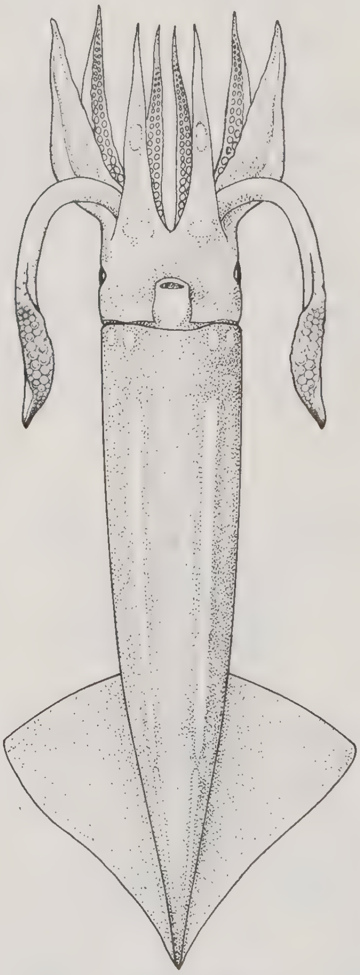
OMMAS Symp 2

Symplectoteuthis luminosa Sasaki, 1915, J.Coll.Agric., Tohoku Imp.Univ., 6(6):144.

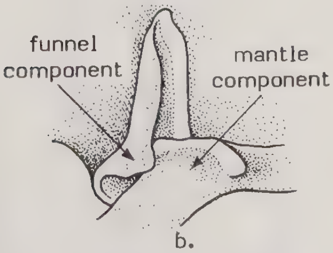
Synonymy : Eucleoteuthis luminosa Berry, 1916 - invalid generic name.

FAO Names :
En - Luminous flying squid
Fr - Encornet lumineux
Sp - Pota luminosa

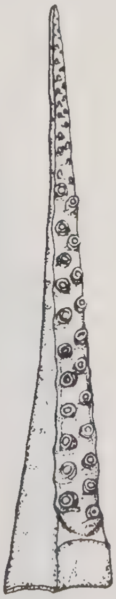
Diagnostic Features : Mantle muscular, conical, tapering to moderately sharp tail. Fins sagittate, length about 50% of mantle length, width about 50% of mantle length; single fin angle 40° (35 to 50°); mantle and funnel fused at locking cartilages; two sets of vivid longitudinal stripes along ventral surface of mantle (are photophores); a large photophoric patch at base of each arm IV. Left arm IV hectocotylized at distal end with absence of suckers; paired papillae are remnants of sucker stalks.



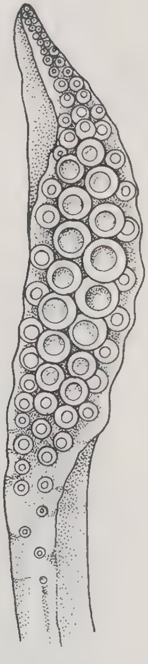
ventral view



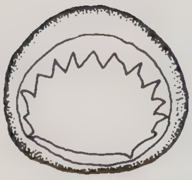
b.
funnel component fused with mantle component



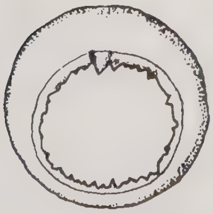
left arm IV of male hectocotylized



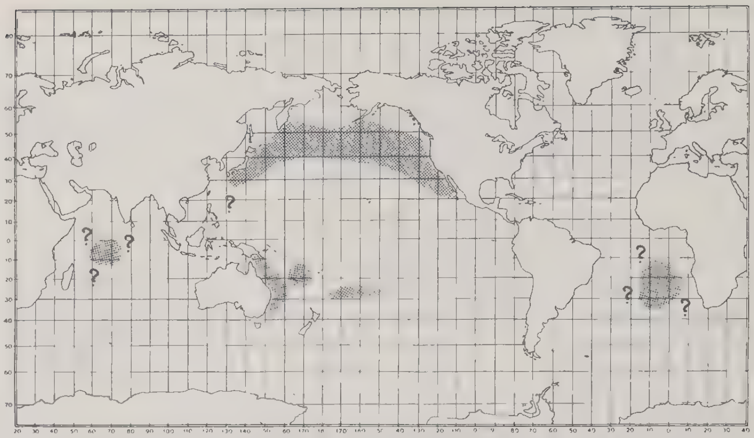
tentacular club



arm sucker ring



tentacular sucker ring



Geographical Distribution : Discontinuous distribution: Pacific Ocean: subtropical and temperate waters. Atlantic Ocean: southeastern Atlantic, distribution undetermined. Indian Ocean: distribution undetermined.

Habitat and Biology : An oceanic species with unknown depth distribution, probably not deeper than 1 300 m, reaching into surface waters; does not appear to school as do most other ommastrephids.

Size : Maximum mantle length 18 cm in females, about 20 cm in males.

Interest to Fisheries : S. luminosa constitutes an incidental catch of the jigging fishery for Todarodes pacificus, but is not utilized currently. Apparently abundant in mixing waters between the Kuroshio and the Oyashio off Japan.

Local Names : AUSTRALIA: Striped squid; JAPAN: Sujiika; USA: Luminous flying squid.

Symplectoteuthis oualaniensis (Lesson, 1830)

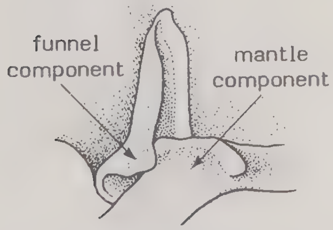
OMMAS Symp 1

Loligo oualaniensis Lesson, 1830, Voy.Coquillel, 2(1):240.

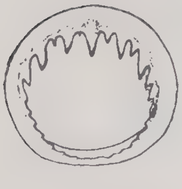
Synonymy : Loligo oualaniensis Lesson, 1830; Ommastrephes oceanicus Orbigny, 1835-1848; Loligo vanicoriensis Quoy & Gaimard, 1832.

FAO Names : En - Purpleback flying squid
Fr - Encornet bande violette
Sp - Pota cárdena

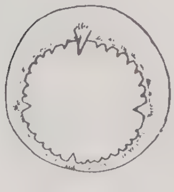
Diagnostic Features : Mantle very muscular, conical posteriorly. Fins muscular, broad, width 79% (69 to 86%) of mantle length, length 43% (39 to 50%) of mantle length; single fin angle 64° (61 to 71°); males have wider fins than females; mantle and funnel fused at locking cartilages; a large, oval photophoric patch on anterodorsal surface of mantle (see remarks).



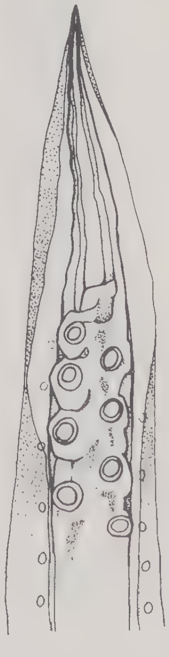
b.
funnel component fused with mantle component



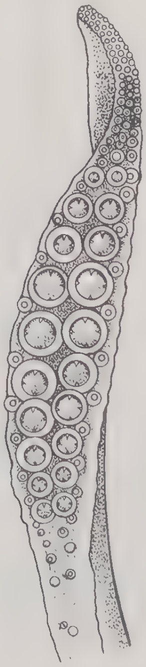
arm sucker ring



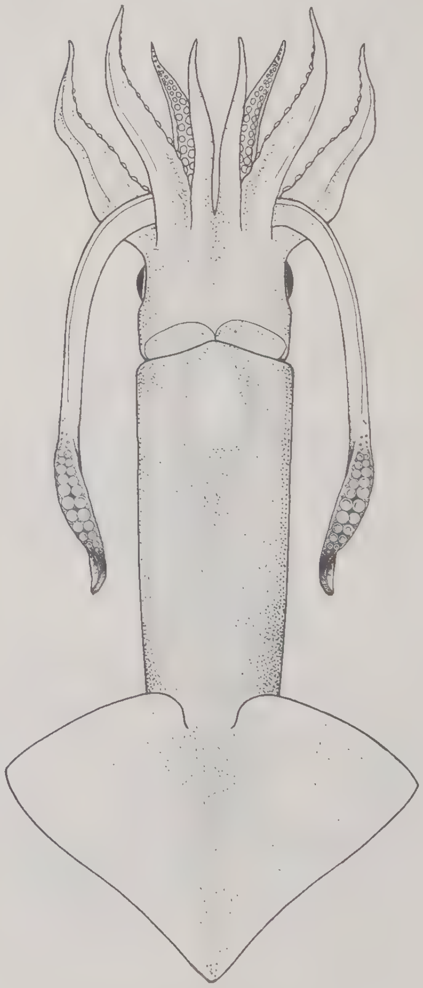
tentacular sucker ring



arm IV of male hectocotylized



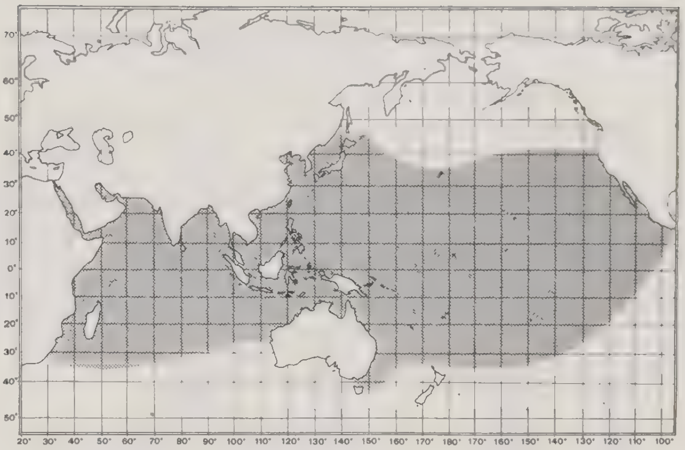
tentacular club



dorsal view

Geographical Distribution : Indo-Pacific; Indian Ocean: entire area north of approximately 25°S. Pacific Ocean: entire area south of approximately 45°N and north of 30°S on western side and 10°N on eastern side.

Habitat and Biology : An oceanic species occurring from the surface to probably 1 000 m depth, largely replacing the genus Ommastrephes in the western Pacific and Indian Ocean. It is known to carry out diurnal vertical movements between the surface at night and deeper layers during the day. Little is known about seasonal migrations of either form or species (see remarks). In Chinese waters, 3 seasonal subpopulations seem to exist. They are preyed upon by sea birds and fishes.



Size : Maximum mantle length 35 cm. Females with the dorsal light organ mature at about 18 cm, males at less than 13.6 cm; females without the light organ at 10.7 cm.

Interest to Fisheries : The species supports local fisheries in Okinawa (June to November) and Taiwan (Province of China) (March to November, peak May to August), and is dipnetted or jigged at the surface day and night. Mechanical jigging machines were tried near Okinawa and Fiji with poor results. The species is the primary fishing bait imported to Okinawa from Taiwan (Province of China); its meat is thick. Voss (1973), speculates a potential of at least 100 000 metric tons in the central eastern Pacific. The species also occurs in commercial quantities in the northwestern Indian Ocean with large concentrations in the Gulf of Aden and the Arabian Sea, and is abundant around the Hawaiian Islands, where it is used for bait in the seasonal tuna fishery; caught by jigging; results of experimental fishing indicate a large population.

Local Names : AUSTRALIA: Yellow-backed squid; JAPAN: Tobiika; USA: Purpleback flying squid.

Literature : Dunning (1982, identification); Osako & Murata (in press, resources).

Remarks : Two sympatric species are known under the name S. oualaniensis: (1) a larger one with a dorsal photophore on the mantle, much more frequently captured; (2) a smaller one, without photophore, and infrequently captured. The name probably applies to the larger, more common, shallower-living species.

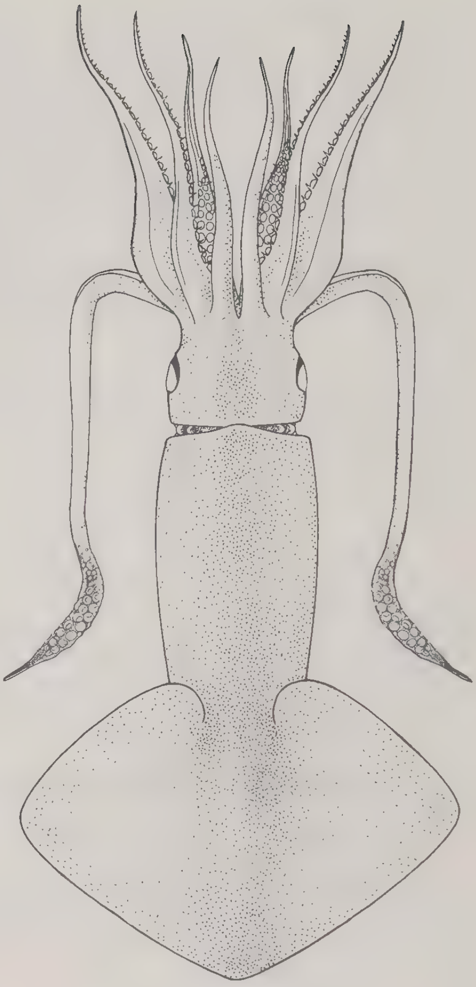
Dosidicus gigas (Orbigny, 1835)

OMMAS Dosid 1

Ommastrephes gigas Orbigny, 1835, in 1834-1848, Voy.Amer.Merid., 5(3):50.

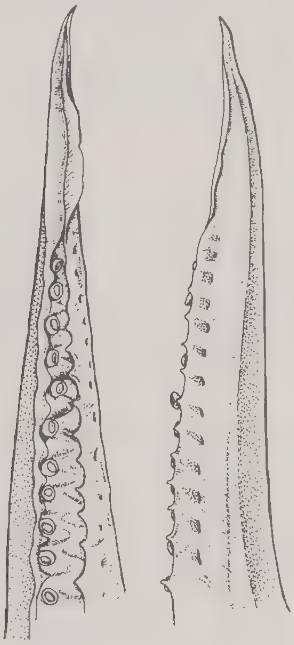
Synonymy : Ommastrephes gigas Orbigny, 1835; Ommastrephes giganteus Gray, 1849; Dosidicus eschrichti Steenstrup, 1857; Dosidicus steenstrupi Pfeffer, 1884.

FAO Names : En - Jumbo flying squid
Fr - Encornet géant
Sp - Jibia gigante



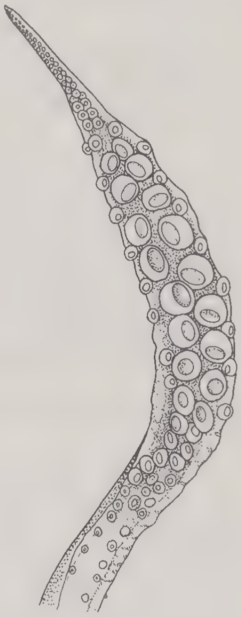
dorsal view

Diagnostic Features : A very large squid. Mantle very large, robust, thick-walled. Fins rhomboidal, muscular, broad, width 56% of mantle length (49 to 65%), length 45% (41 to 49%) of mantle length, single fin angle 57^{0} (50 to 65^{0}). Distal end of arms (adults especially) drawn out into very long, attenuate tips with 100 to 200 minute, closely packed suckers; dorsal protective membrane very weakly developed, but trabeculae are well-developed, exposed papillae, either arm IV hectocotylized (not both on same specimen) by absence of suckers and stalks at tip, and expanded and perforated protective membranes.



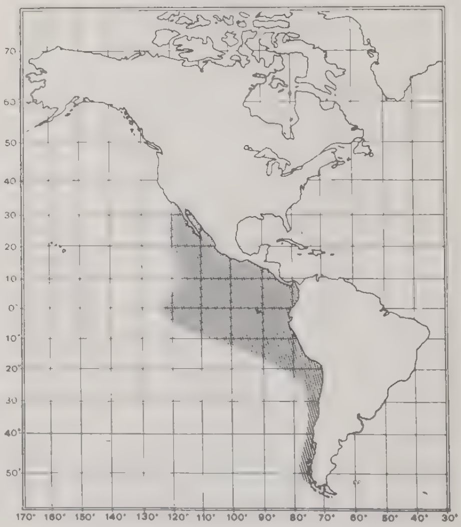
oral view lateral view

left arm IV of male hectocotylized



tentacular club

Geographical Distribution : Eastern Pacific: from approximately 35^{0}N south to Tierra del Fuego.



Habitat and Biology : An oceanic and neritic species occurring from the surface to 500 m (?) depth; it is most abundant and largest off South America, where adults are found in water temperatures of between 26 and 28^{0}C to much colder. In nearshore waters, it occurs near to the surface day and night. In the Gulf of California a single stock composed of several cohorts has been identified. Its seasonal migrations, similar to those of other ommastrephids, are described by Ehrhardt et al. (in press). The cohorts grow at different rates depending on the environmental conditions at the time of hatching, but all recruit into the fishery around May each year. Longevity is about 1 year for the population in the northern hemisphere. Mortality after spawning is high. This species feeds on larvae of pelagic fishes such as lanternfishes, sardines, mackerels and sauries, and on crustaceans. Cannibalism is common. It is in turn preyed upon by swordfish, sharks, porpoises and other mammals.

Size : Maximum total length 4 m, maximum mantle length 1.5 m off Chile, about 1 m in the northern population; length at first maturity in the latter ranges between 35 and 40 cm in females (4 to 6 months of age) and from 18 to 25 cm in males (2 to 3 months of age). Common length about 50 to 80 cm, common weight 2 or 3 kg.

Interest to Fisheries : Exploratory fishing for this species was initiated in the early seventies in several areas along the Pacific coast of America. While the operations by Japanese vessels off Chile were discontinued because of insufficient landings, Mexican catches increased from 14 tons in 1974 to over 19 000 tons in 1980, but deteriorated subsequently, to about 10 000 tons in 1981 (FAO, 1983) and to even lower levels in the 1982-83 fishing season. Most of these catches are taken by Japanese jigger boats under a joint venture scheme and by

Mexican shrimpers that switch to squid fishing during the closed season for shrimp fishing. The best catches are obtained during the summer months, but the season has been progressively expanded, so that fishing now occurs throughout the year. Jigging operations are enhanced at night by light attraction. The sport fishery for the species, off southern California, is of very limited importance. This squid is mainly used as bait, some of it is dried for human consumption, and in Chile, small amounts are marketed canned. A market for frozen filets has recently developed in the western USA.

Local Names : JAPAN: Amerikaooakaika, Amerika-oosurume, Jumbo squid; USA: Jumbo flying squid.

Literature : Ehrhardt et al. (in press, biology and fishery, Gulf of California, Mexico); Sato (1976, exploratory fishing, Mexico).

Ornithoteuthis antillarum Adam, 1957

OMMAS Orni 1

Ornithoteuthis volatilis antillarum Adam, 1957, Bull.Inst.Roy.Sci.Nat.Belg., 33(7):3.

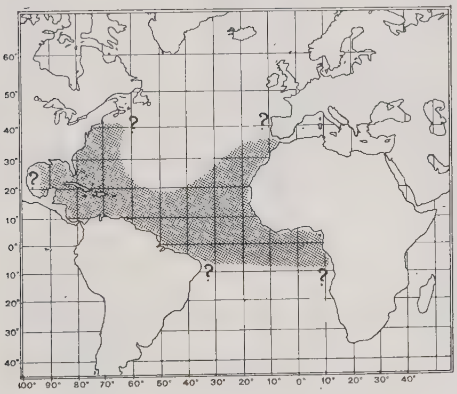
Synonymy : None.

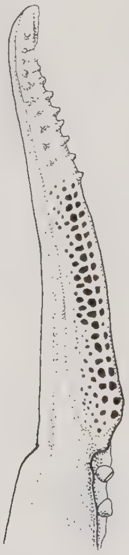
FAO Names :

En	-	Atlantic bird squid
Fr	-	Encornet oiseau
Sp	-	Pota pájaro

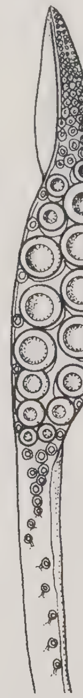
Diagnostic Features : Mantle muscular, narrow, drawn out posteriorly into a long pointed tail. Funnel groove with foveola with 7 to 12 indistinct folds, side pockets often obscure. No external light organs; a long, thin usually pinkish stripe of luminiscent material along the ventral surface of the viscera from about the level of the heart to the posterior tip of the viscera; discrete light organs on the ink sac and rectum. Tentacular club moderately expanded, no distinct fixing apparatus on tentacular stalk.

Geographical Distribution : Eastern Atlantic: from the Straits of Gibraltar to slightly south of the equator; tropical and subtropical western Atlantic and Caribbean Sea.

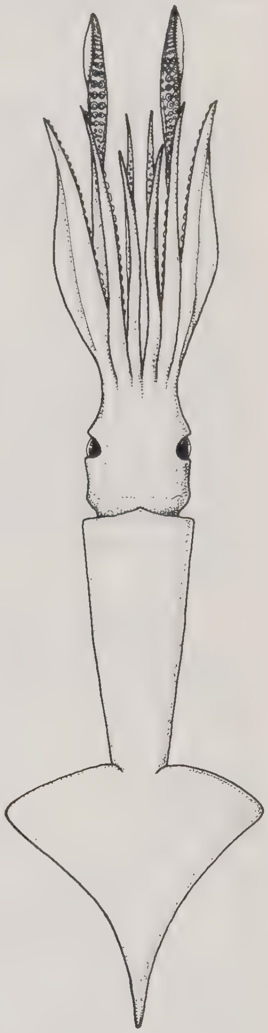




arms IV of male hectocotylized



tentacular club



dorsal view

Habitat and Biology : An oceanic species occurring between the surface and about 1 100 m depth. It is a powerful swimmer carrying out diel vertical movements resulting in capture in bottom-trawls at 580 to 1 100 m depth (mostly 640 to 825 m) during the day, and in midwater trawls at 100 to 600 m over very deep waters and by dipnets at the surface in the open ocean at night. The species feeds on other cephalopods, shrimps and small fishes. It is probably in turn preyed upon by marine mammals such as Tursiops truncatus, and by billfishes and tunas.

Size : Maximum mantle length of an unsexed individual 20 cm; off the West Indies, 10.3 cm in females, 14.1 cm in males.

Interest to Fisheries : The species is not currently fished commercially. It may inhabit continental shelf and slope waters or be associated with islands, as major catches were made in bottom trawls. Too few data are available on distribution. Separate statistics are not reported for this species. Fishing techniques would include jigging, dipnetting and especially otter and midwater trawling. The species should be edible, as other members of the family are confirmed to be good.

Local Names : USA: Atlantic bird squid.

Literature : Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31); Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part).

Ornithoteuthis volatilis Sasaki, 1915

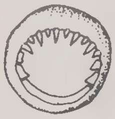
OMMAS Orni 2

Ommastrephes volatilis Sasaki, 1915, J.Coll.Agri.Tohoku Imp.Univ.Sapporo, 6(6):138.

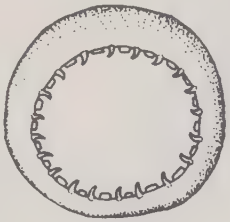
Synonymy : Ommastrephes volatilis Sasaki, 1915.

FAO Names :
En - Shiny bird squid
Fr - Encornet planeur
Sp - Pota planeadora

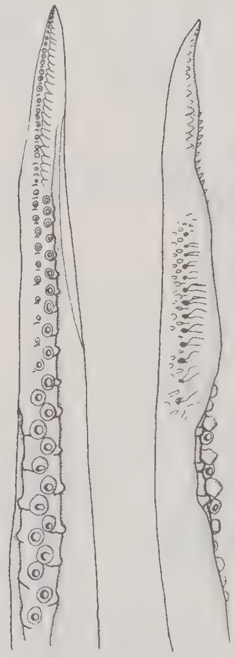
Diagnostic Features : Mantle very narrow, drawn out posteriorly into a long pointed tail; muscular. Fins long, sagittate, sharply lanceolate posteriorly; length 55% (51 to 59%) of mantle length, width 47% (45 to 51%) of mantle length, single fin angle 27° (20 to 35°). Tentacular club expanded with very large medial manal suckers, their rings with 18 to 20 evenly spaced, pointed teeth of same size. Arm sucker rings with 10 to 14 sharp teeth; right arm IV hectocotylized in distal half with suckers reduced in size, stalks modified to papillae particularly in dorsal row, and protective membranes swollen with honey-combed ridges and deep depressions. A large oval photophore present on intestine.



arm sucker ring

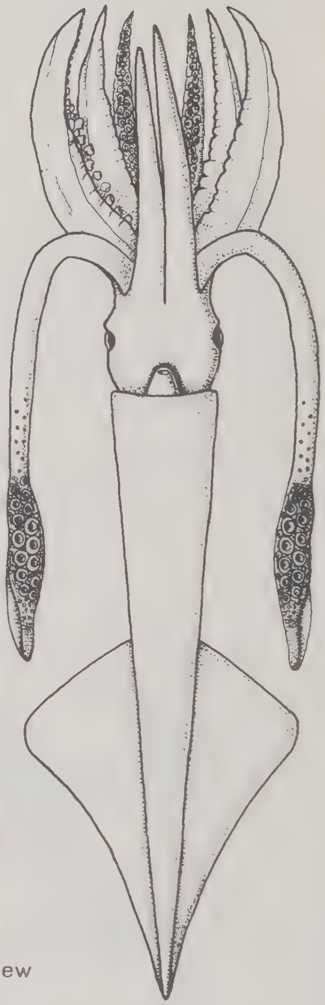


tentacular sucker ring



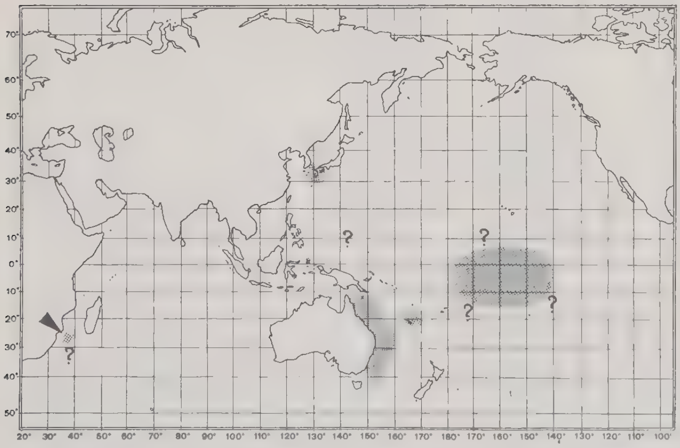
oral view lateral view

arm IV of male hectocotylized



ventral view

Geographical Distribution : Central and western Pacific in warm and warm temperate waters.



Habitat and Biology : A very poorly known oceanic species; very rarely collected at the surface, even at night. Japanese fishermen report it occasionally gliding above the surface of the sea.

Size : Maximum mantle length 21 cm in females, 31 cm in males.

Interest to Fisheries : Apparently too rarely encountered currently to represent a worthwhile fishery potential. Size and consistency of flesh are good, however, if concentrations would be found the species could be used for human consumption.

Local Names : AUSTRALIA: Long-tailed flying squid; JAPAN: Tobi-ika, Yasetobi-ika.

Literature : Okutani (1980).

Martialia hyadesi Rochebrune & Mabille, 1889

OMMAS Mart 1

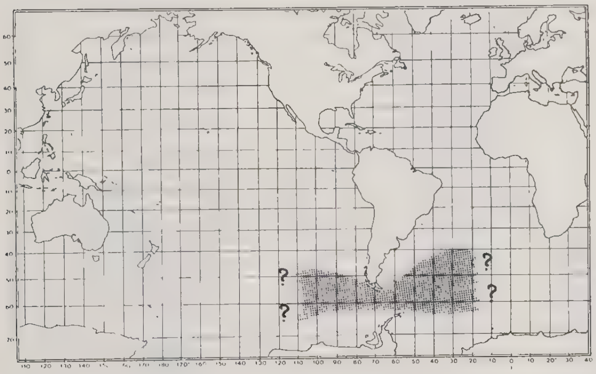
Martialia hyadesi Rochebrune & Mabille, 1889, Miss.Sci.Cap Horn, 6:9.

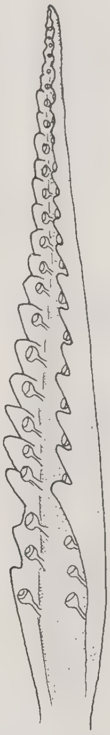
Synonymy : None.

FAO Names : En - Sevenstar flying squid
Fr - Encornet étoile
Sp - Pota festoneada

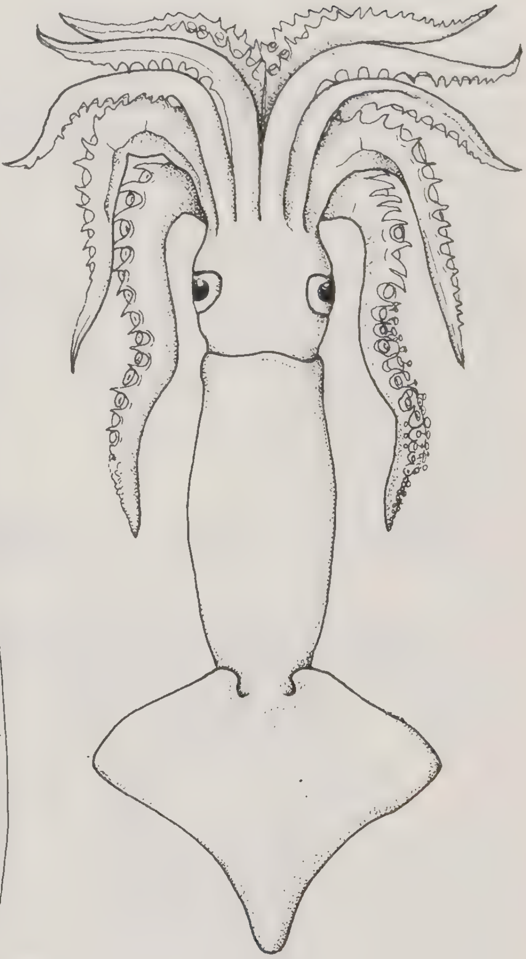
Diagnostic Features : Mantle robust, tapers to a somewhat elongated tail. Fins rhomboidal, elongated posteriorly, single fin angle 35 to 45%. Funnel groove with foveola, no side pockets, 7 longitudinal folds. Tentacular clubs occupy almost entire length of tentacles. Protective membranes on arms very weak and low, but trabeculae very strongly developed into prominent, pointed cirri all along the arms; suckers proportionally small, rings with 5 teeth in distal half, central one conical, lateral ones becoming truncated; proximal half of ring smooth; right arm IV hectocotylized in males.

Geographical Distribution : Southern Ocean: southwestern Atlantic (39 to 51°S), South Pacific, and Antarctic Convergence; exact distribuition undetermined.





arms IV of male hectocotylized



dorsal view

Habitat and Biology : An oceanic species; exact depth distribution unknown; biology unknown.

Size : Maximum mantle length approximately 40 cm.

Interest to Fisheries : So far, no fisheries have developed for this species, but it is believed to have some potential.

Local Names :

Hyaloteuthis pelagica (Bosc, 1802)

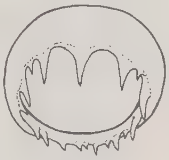
OMMAS Hyal 1

Sepia pelagica Bosc, 1802, Hist.Nat.Coquilles V. I. In Histoire Naturelle de Bouffon, p. 46.

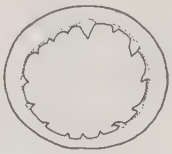
Synonymy : Sepia pelagica Bosc, 1802; Ommastrephes pelagicus Orbigny, 1835-1848.

FAO Names :
En - Glassy flying squid
Fr - Encornet vitreux
Sp - Pota estrellada

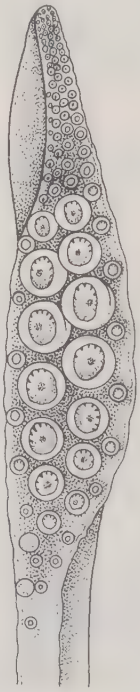
Diagnostic Features : Mantle muscular, narrow (17 to 19% of mantle length), cylindrical nearly to posterior end, then tapers suddenly to a point; ventral surface of mantle covered with 19 relatively large, round photophores in a distinct pattern, primarily in pairs; 3 round photophores along ventral surface of arm IV: at the base, the midpoint and near distal tip. Fins relatively short (37% of mantle length), width 58% (57 to 61%) of mantle length, single fin angle about 50° (45 to 55°). Right (occasionally left) arm IV hectocotylized in males.



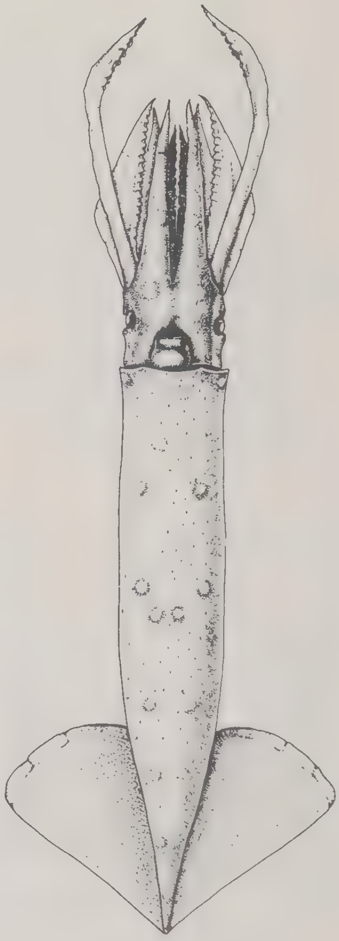
arm sucker ring



tentacular sucker ring

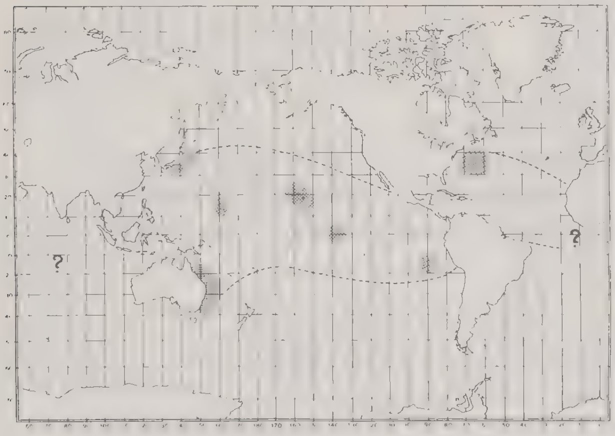


tentacular club



ventral view

Geographical Distribution : Warm waters of Atlantic and Pacific (Indian?) oceans; limits undetermined.



Habitat and Biology : An oceanic species occurring between the surface and about 200 m depth. It is believed to carry out diel vertical migrations, being encountered at or near the surface at night and in deeper waters during the day. It is preyed upon, i.e. by black noddy terns (Anöus tenuirostris), and finfishes.

Size : Maximum mantle length 9 cm.

Interest to Fisheries : A rather rarely captured species; its fishery potential is at present undetermined.

Local Names :

Literature : Clarke (1966, biology).

4.14 FAMILY THYSANOTEUTHIDAE Keferstein, 1866

THYSANO

Thysanoteuthidae Keferstein, 1866, *Bronn's Klass.Ordn.Thierreichs*, 1862-66:1445.

FAO Names : En - Rhomboid squids
Fr - Chipilouas
Sp - Chipirones

Diagnostic Features : The family is characterized by a funnel locking-cartilage with a long, narrow longitudinal groove and a short, broad transverse groove (⊣-shaped); long broad fins in the shape of a rhombus that extend nearly the full length of the mantle; a nuchal-mantle lock with two distinct knobs that fit into opposing pits; extremely long, cirrate trabeculae on the arms; buccal connectives that attach to the ventral borders of arms IV; two rows of suckers on the arms and four rows of suckers on the manus; the absence of photophores.

General Remarks on the Family : Two genera, *Thysanoteuthis* and *Cirrobrachium*, are currently included in the family. *Cirrobrachium* is known only from a few larval forms and a single, larger fragmentary specimen; it is distinguished by long, slender free cirri (trabeculae) on the arms. So little is known about the characters of the two nominal species of *Cirrobrachium* that the genus is in question. The monotypic species of the other genus, *Thysanoteuthis rhombus*, attains a large size (at least 100 cm mantle length and 20 kg weight) and is a very powerful swimmer. It is the only species of some interest to fisheries.

Thysanoteuthis rhombus Troschel, 1857

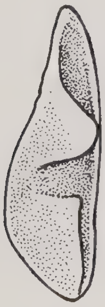
THYSANO Thysano 1

Thysanoteuthis rhombus Troschel, 1857, *Arch. Naturgesch.Berlin*, 32(1):70.

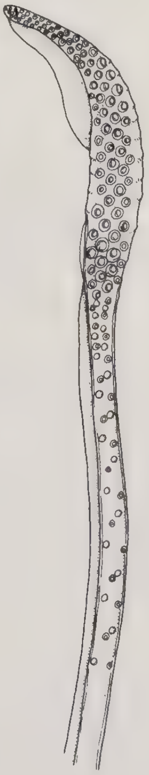
Synonymy : *Thysanoteuthis nuchalis* Pfeffer, 1912.

FAO Names : En - Diamondback squid
Fr - Chipiloua commun
Sp - Chipirón volantín

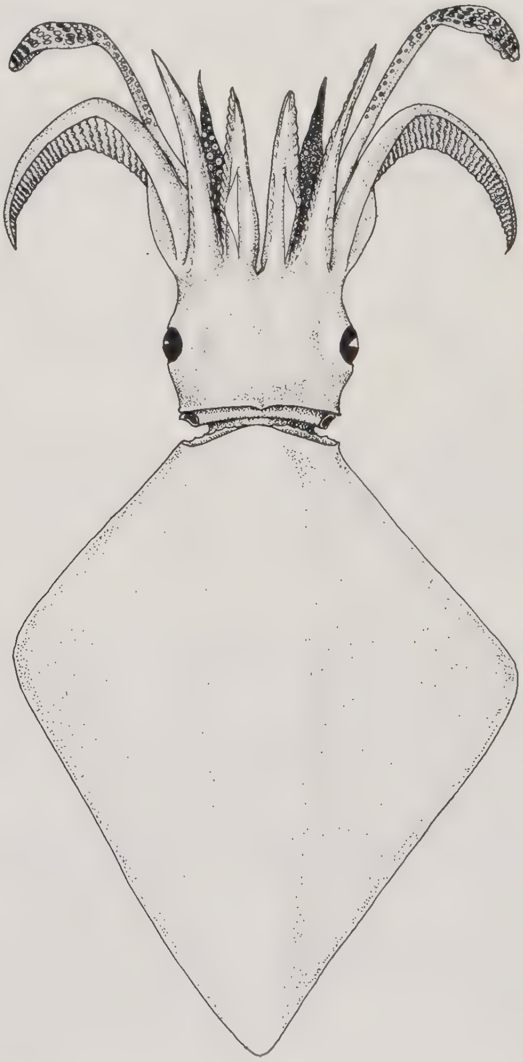
Diagnostic Features : Mantle thick, muscular, tapering to a blunt tip posteriorly. Fins long, broad, rhombic (◇) occupying the entire length of mantle; mantle-funnel locking apparatus -shaped. Tentacular clubs with 4 rows of suckers; arms with 2 rows of suckers; buccal connectives attached to ventral borders of arms IV .



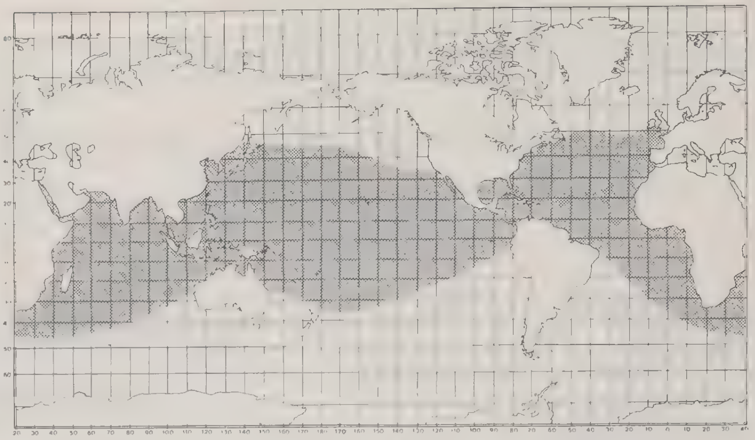
funnel-locking apparatus



tentacular club



dorsal view



Geographical Distribution : Presumed to occur worldwide in warm and warm temperate seas, but limits not well defined.

Habitat and Biology : An epipelagic, oceanic species, often occurring in pairs or small schools in surface waters; the lower limits of its depth distribution are unknown. Off Japan, seasonal migrations with the Kuroshio and Tsushima currents are reported, the squids entering the Japan Sea from the south. The spawning season and areas are unknown, but 'sausage'-like, gelatinous egg masses measuring 60 to 70 cm in length and about 15 to 20 cm in diameter are encountered floating at or near the surface. Adults are very powerful swimmers and are reported to jump occasionally on to the deck of boats. They are also known from strandings. Predators include sperm whales and blue marlins.

Size : Maximum mantle length 100 cm and weight 20 kg; common to 60 cm mantle length.

Interest to Fisheries : In the Japan Sea a local fishery exist on this species. The fishing fleet consists of small units of about 5 tons numbering up to 200 in the peak fishing season. Catches are better at night with drifting jigs, but the species is also taken during the day. Off the west coast of mid-Honshu set nets are the preferred gear.

Local Names : JAPAN: Ootobiika, Sodeika, Taruika.

Literature : Clarke (1966, migration); Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31); Roper & Sweeney (1981, Species Identification Sheets, eastern central Atlantic, fishing areas 34/47 in part).

4.15 FAMILY CRANCHIIDAE Prosch, 1849

CRANCH

Cranchiidae Prosch, 1849, Kong.Dans.Viden.Selsk., (5)1:71.

FAO Names :
En - Cranch squids
Fr - Encornets outres
Sp - Cranquilurias

Diagnostic Features : The family Cranchiidae contains a great diversity of species which exhibit a wide variety of basic characters. One prominent character, however, easily distinguishes all members of the group: the mantle is fused to the head in the nuchal region and to the funnel at its two posterolateral corners. Buccal connectives attach to the ventral borders of arms IV; the armature of the clubs generally is in four longitudinal rows; the arms generally have biserial suckers; hooks occur in some species; photophores are present.

The numerous cranchiid genera are grouped under two subfamilies, the Cranchiinae and the Taoniinae.

The Cranchiinae is characterized by the presence of cartilaginous strips bearing tubercles on the ventral surface of the mantle originating at the funnel-mantle fusions and extending posteriorly by the lateral fusion of the funnel to the ventral surface of the head in the adult stage, and by one or more rows of small, round photophores on the eye. This subfamily contains the genera Cranchia, Liocranchia and Leachia.

The Taoniinae is characterized by the absence of cartilaginous strips that extend posteriorly from the funnel-mantle fusions, by the presence of a funnel that is free laterally, and by the presence of one to three generally crescent-shaped photophores on the eyes. This subfamily contains numerous and diverse species that are arranged in several genera, many of which are based on larval forms (e.g., Fusocranchia, Teuthowenia, and Taonidium). The genera are: Taonius, Egea, Sandalops, Liguriella, Teuthowenia, Megalocranchia, Helicocranchia, Galiteuthis, Bathothauma, and Mesonychoteuthis.

An illustrated key to the genera of this family is given by Voss (1980).

The monotypic genus Mesonychoteuthis, represented only by M. hamiltoni is the only one considered to be of potential interest to fisheries at the present time. It has large hooks on both the tentacles and arms; it attains a total length of at least 4 m. A related genus, Galiteuthis, has large hooks only on the tentacular clubs. Taonius has a few greatly enlarged teeth, closely approximating hooks, that arise from the sucker rings on the tentacular clubs.

Mesonychoteuthis hamiltoni Robson, 1925

CRANCH Meso 1

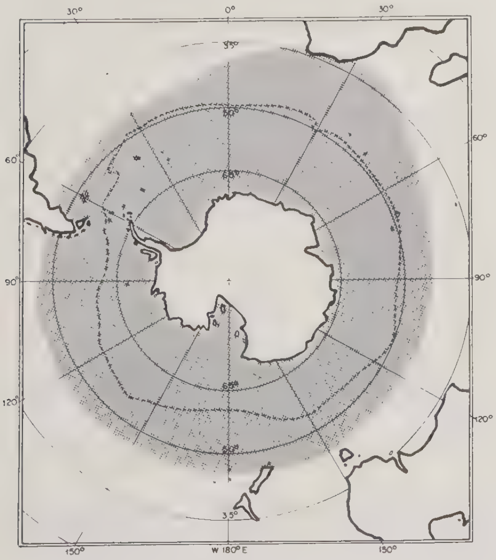
Mesonychoteuthis hamiltoni Robson, 1925, Ann.Mag.Nat.Hist., (9)16:272.

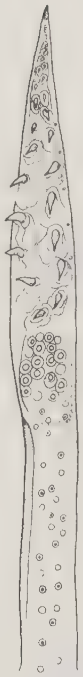
Synonymy : None.

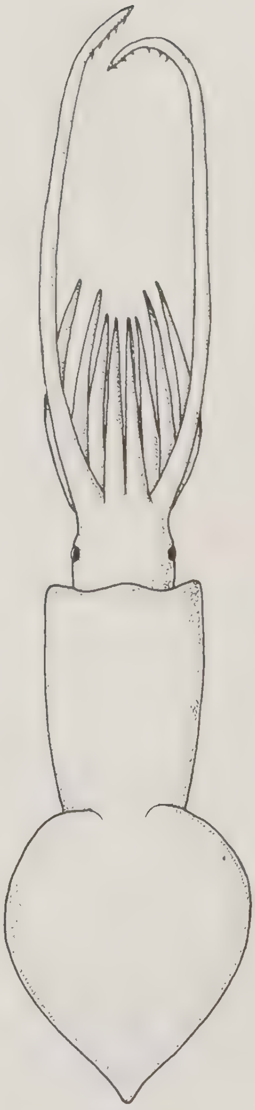
FAO Names :	En - Antarctic cranch squid
	Fr - Encornet outre commun
	Sp - Cranquiluria antártica

Diagnostic Features : This is a very large species. Mantle broad, tapering in its posterior third to a long, narrow, sharply pointed tail; mantle wall up to 5 to 6 cm thick, soft, slightly semigelatinous; mantle fused to head dorsally at neck and ventrally to the funnel at the site of the locking cartilages. Fins over half as long as mantle, heart-shaped, broad, muscular. Head narrower than mantle. Tentacular clubs relatively unexpanded, lacking swimming keels and protective membranes, with 2 rows of well-developed hooks medially on manus (up to 22) and minute lateral suckers; 4 rows of minute suckers on dactylus. Arms very thick, muscular, long, attenuate at tips, with broad protective membranes basally, mid-portion with 3 to 11 pairs of hooks, distal third with suckers.

Geographical Distribution : Southern Ocean, circumpolar, primarily south of Antarctic Convergence, occasionally north in cold waters to off South Africa.




tentacular club


dorsal view

Habitat and Biology : A mesopelagic species, ranging in depth from 200 to 600 m; a relatively passive swimmer. Feeds on mesopelagic fishes (Myctophidae, Paralepididae) and squids and is very heavily preyed upon by sperm whales at 400 to 600 m during the sperm whales feeding migration to the Southern Ocean in summertime; juveniles are occasionally also preyed upon by albatrosses.

Size : Maximum mantle length 250 cm; total length exceeds 4 m; maximum weight 150 kg; matures at mantle lengths greater than 100 cm and 25 to 30 kg weight; spermatophores are 17 to 27 cm long.

Interest to Fisheries : This species is believed to have some potential for a fishery. The flesh is said to be of excellent quality and very flavourful. Klumov & Yukhov (1975) estimate that 1 or 2 million tons can easily be taken in view of reduced sperm whale predation (whole population decline); total reserves estimated at 90 million tons (biomass); but fishing methods have not yet been developed.

Local Names :

Literature : Voss (1980, generic revision of family).

5. OCTOPUSES (Order Octopoda)

Octopoda Leach, 1818, Zool.Miscell., 3(30):138.

The Order Octopoda apparently became distinct from the Coleoid basic line in the Middle Triassic (Jeletzky, 1966). Octopods are divided into two suborders; Cirrata, mostly deep-sea pelagic and epibenthic forms which possess cirri along the arms and have paddle-shaped fins and Incirrata, moderately deep to shallow-living benthic and epipelagic forms which posses neither cirri nor fins. Only the Incirrata are of commercial interest, with some species of Octopus supporting among the major fisheries for cephalopods.

Diagnostic Features : Eight circumoral arms, no tentacles; fins subterminal (on sides of mantle), widely separated, or absent; shell reduced, vestigial, "cartilagenous", or absent; suckers without chitinous rings, set directly on arms without stalks; eye open to sea with primary and secondary (concentric) lids; branchial canal present on gills between down-folded filaments (some exceptions); liver a single structure with incorporated pancreas; central (rachidian) tooth of radula with 1 large projection and 2 or more small lateral cusps, first and second lateral teeth multicuspid; buccal membrane absent; olfactory organ a ciliated pit.

Suborder Incirrata Grimpe, 1916

Incirrata Grimpe, 1916, Zool.Anz., 46(12):353.

Only one of the eight famlies, Octopodidae, is commercially exploited, although other species taken incidentally also are utilized.

Diagnostic Features : Eight arms with suckers only, no cirri; fins absent.

5.1 FAMILY OCTOPODIDAE Orbigny, 1845

OCT

Octopodidae Orbigny, 1845, Moll.Viv.Foss., 1:164.

FAO Names : En - Octopuses
Fr - Pieuvres, Poulpes
Sp - Pulpitos, Pulpos

General Remarks on the Family : The systematics of the Octopodidae is in a thoroughly unsettled state and the group is very much in need of systematic revision. Three subfamilies exist. Octopodinae, Eledoninae, and Bathypolypodinae (see generic list); separated by relatively minor characters, they all are easily recognizable as octopuses. There are 21 currently accepted genera in this large family, however, only Octopus commonly supports major fisheries.

Habitat and Biology : Most octopuses are benthic animals. Representatives of the family are usually encountered throughout the world from the coast down to at least 1 000 m depth. Many species have cryptic habits hiding in crevices, empty mollusc shells and seagrass beds during the day and hunting at night, others occur over open trawlable bottoms. Many species lay relatively large eggs which are brooded by the female during a prolonged incubation period. During this time females often almost cease feeding and hence in these species, female mortality after the hatching of the eggs is high. Most brooding species have a direct development and hatchlings almost immediately adopt the benthic life of the adults. In other species, the larvae pass through a pelagic stage prior to switching to benthic life. Particularly cryptic species have a well developed territorial behaviour and therefore rarely form aggregations.

Interest to Fisheries : Octopuses are the most traditional of all cephalopod resources, and have been exploited for more than 2 000 years. Their catches during the last few decades have fluctuated between 150 000 and 230 000 metric tons annually (190 000 tons in 1981, representing 14.6% of world cephalopod fisheries in that year (FAO, 1983). The most important octopus fisheries and markets are located in Asia (particularly Japan) and in the Mediterranean countries. Fishing gears for these resources include pots, traps, spears and hooks for the cryptic species, and bottom trawls and seines for those living in open areas.

Octopus aegina Gray, 1849

OCT Oct 6

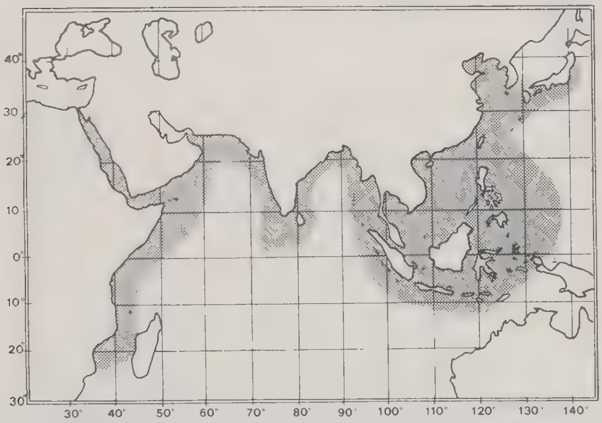
Octopus aegina Gray, 1849, Cat.Moll.Brit.Mus., 1:7.

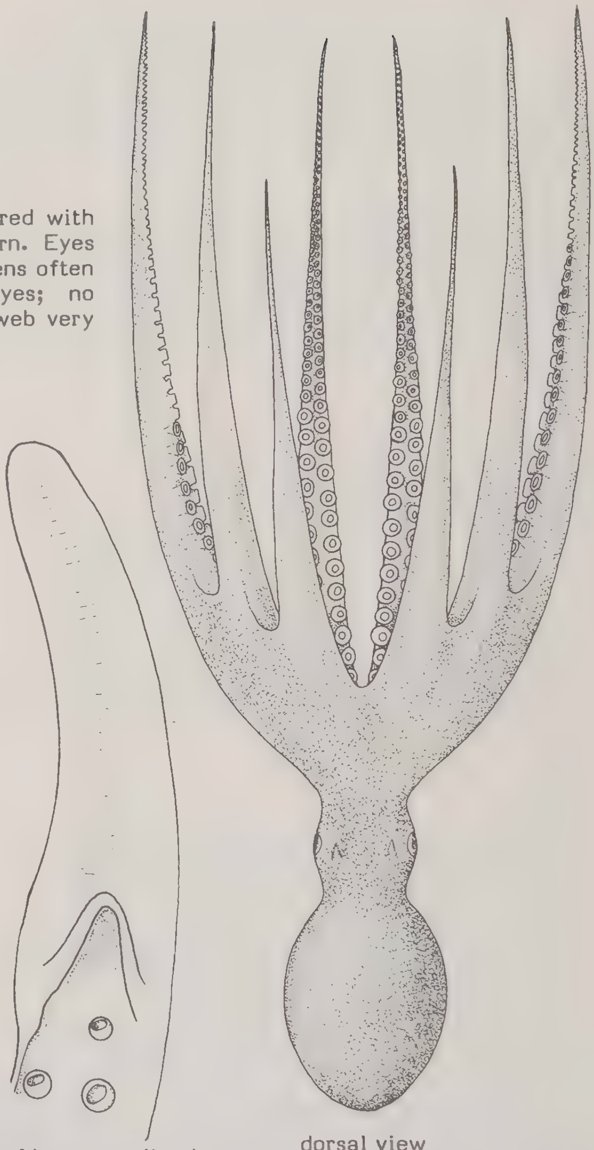
Synonymy : Octopus kagoshimensis Ortmann, 1888.

FAO Names :
En - Sandbird octopus
Fr - Poulpe des sables
Sp - Pulpo reticulado

Diagnostic Features : Mantle rounded to oval, covered with small tubercles or fine papillae arranged in a reticulate pattern. Eyes prominent, a single cirrus dorsal to each eye; fresh specimens often with a white band across basal surface of head between eyes; no ocellae. Arms long, robust, arms I strikingly the shortest; web very shallow between arms I, moderate depth between other arms; a dark patch of chromatophores appears at the base of each sucker on the dorsal side of each arm; right arm III hectocotylized, ligula short, 5 to 8% of arm length; ligula with very shallow groove; calimus small, distinct; 7 to 10 lamellae on outer demibranch of gill; eggs very small - 2 mm long.

Geographical Distribution : Western Pacific, Indian Ocean, Red Sea, Japan to Mozambique.





tip of hectocotylized right arm III of male

dorsal view

Habitat and Biology : A benthic, not highly cryptic species, common on the continental shelf from 30 to 120 m depth.

Size : Maximum mantle length 10 cm (total length 30 cm), weight 0.4 kg.

Interest to Fisheries : Together with Cistopus indicus, this is the commonest species in Indo-Malayan markets. It is trawled on the continental shelf or caught with traps and on hook-and-line. It also supports subsistence fisheries in East Africa.

Local Names : CHINA: Saa liu (sand bird).

Literature : Voss & Williamson (1971, description, biology).

Remarks : Closely related to O. dollfusi, which might be a synonym.

Octopus briareus Robson, 1929

OCT Oct 3

Octopus briareus Robson, 1929, Ann.Mag.Nat.Hist., (10)3:612.

Synonymy : None.

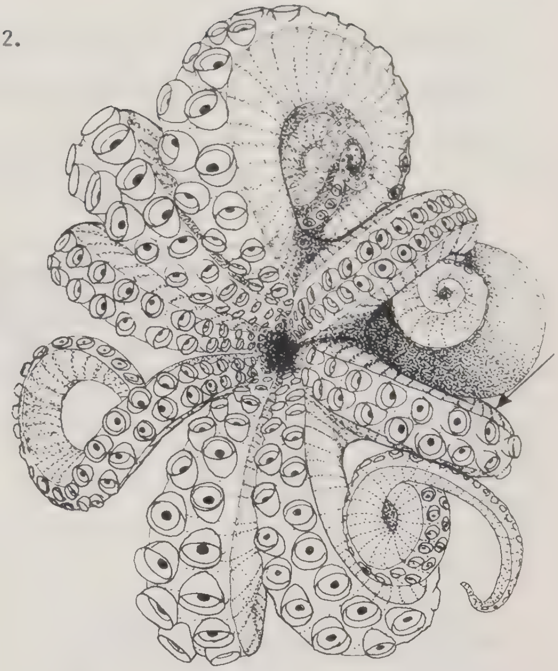
FAO Names : En - Caribbean reef octopus
Fr - Poulpe ris
Sp - Pulpo de arrecife

Diagnostic Features : Body chuncky, with long arms of unequal length and thickness. Dorsal (I) pair of arms shortest, the least stout, arms II and III longest and very stout; right arm III of males hectocotylized by modification of arm tip into a large expanded, ridged and grooved ligula; ligula index (length of ligula expressed as percentage of length of hectocotylized arm) 3 or 4; 6 to 8 gill lamellae on outer side of gill.

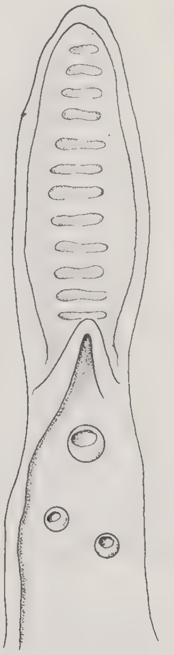
Geographical Distribution : Tropical Western Atlantic: warm waters of southeastern USA, southeastern Gulf of Mexico, Bahamas, Caribbean islands chain and northern South America.

Habitat and Biology : A benthic, cryp-tic species inhabiting coral reefs in very shallow water, but also found on grass flats, and rocky and sandy bottoms. The spawning season extends from about December to March. Males die after mating. Females lay about 500 eggs in small clusters which they brood and which hatch after 65 days (at temperatures of 23°C). Females usually die after hatching. Recently hatched octopus are large and well advanced and settle immediately in the adult habitat. Longevity is about 1 year. This species feeds on crabs, shrimps, molluscs and sometimes on carrion. Cannibalism is common.

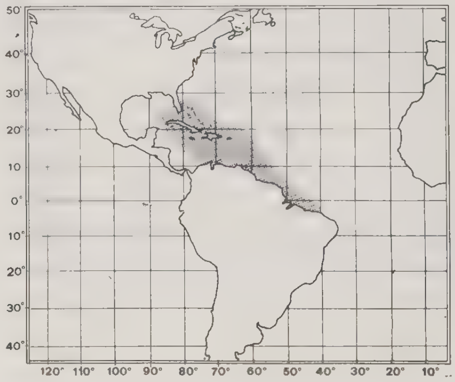
Size : Maximum total length 100 cm and 1.5 kg weight; 60 cm in the warmer parts of the distributional range; common to 40 cm.



oral view



tip of hectocotylized right arm III of male



Interest to Fisheries : It is believed that part of the Octopus vulgaris catch reported for the western central Atlantic, Fishing Area 31 (almost 7 000 metric tons in 1981) (FAO, 1983), is attributable to O. briareus. Although no large-scale fishing operations seem to be directed at O. vulgaris, it is fished locally throughout its distributional range. Fishing methods include spearing over open bottoms in very shallow water, extraction from caves and crevices with hooks mounted on poles, and trapping in the traditional clay pots. Octopuses are used fresh for food and as bait.

Local Names : CUBA: Fabiana; USA: Briar octopus, Caribbean reef octopus.

Literature : Voss (1971, resources); Hanlon (1977, laboratory rearing); Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31).

Remarks : The species has been reared successfully under laboratory conditions and might have some larger-scale aquaculture potential because of its large egg size, direct development, high food conversion efficiency, fast growth, large adult size and its value as a nutritious, marketable food source (Hanlon, 1977).

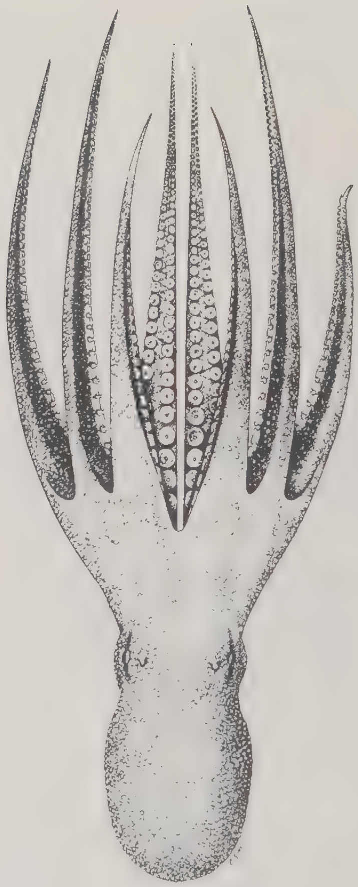
Octopus burryi Voss, 1950

OCT Oct 7

Octopus burryi Voss, 1950, Rev.Soc.Malac., 7(2):76.

Synonymy : Octopus vincenti Pickford, 1955.

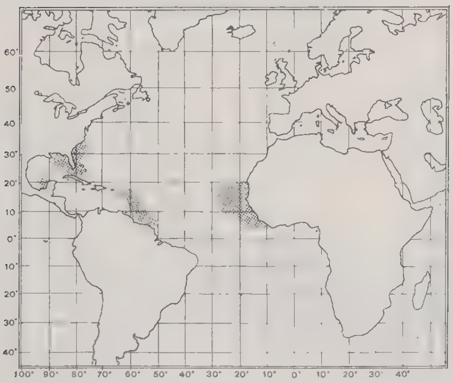
FAO Names : En - Brownstriped octopus
Fr - Poulpe à rayures bleues
Sp - Pulpo granuloso

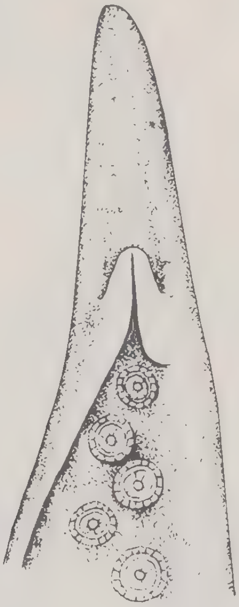


dorsal view

Diagnostic Features : Mantle, head and arms covered with close-set round papillae; dark blue to purplish-brown band along dorso-lateral surface of each arm; one cirrus over each eye. Right arm III hectocotylized; ligula length 2 to 6% of hectocotylized arm length with weak laminae; calimus with deep groove; 9 to 11 filaments on outer demibranch of gill.

Geographical Distribution : Tropical western Atlantic: North Carolina to northern Brazil. Tropical eastern Atlantic: West Africa.





tip of hectocotylized right arm III of male

Habitat and Biology : A benthic species, associated with bottoms composed of sand, broken coral and shells from 10 m to 200 m on the lower part of the continental shelf.

Size : Maximum mantle length 7 cm.

Interest to Fisheries : Currently taken only as bycatch in trawl fisheries.

Local Names : USA: Brownstriped octopus.

Octopus conispadiceus (Sasaki, 1917)

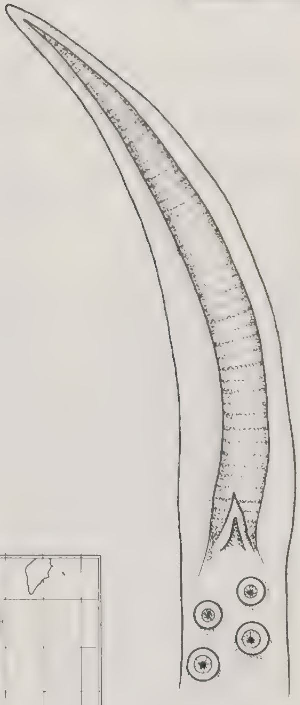
OCT Oct 8

Polypus conispadiceus Sasaki, 1917, Annot.Zool.Japan, 9(3):367.

Synonymy : None.

FAO Names : En - Chestnut octopus
Fr - Poulpe casse-noix
Sp - Pulpo espadaña

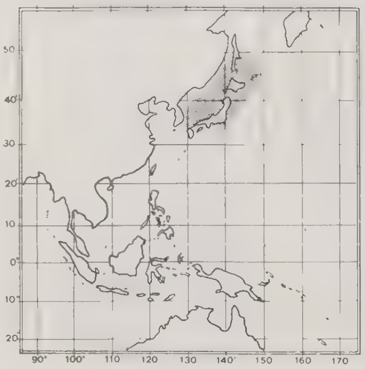
Diagnostic Features : Mantle globular, proportionally small compared with the large, robust arms; surface smooth; one distinct cirrus over each eye. Arms I to III coequal, about 3 times longer than mantle and head; arms IV shorter; right arm III hectocotylized; ligula very conspicuous, 16 to 20% as long as the arm, conical groove deep, narrow, finely striated; calimus acutely pointed, about 1/8 as long as ligula; 20 to 24 gill lamellae (total count).



tip of hectocotylized right arm III of male

Geographical Distribution : Western Pacific: Japan, especially around Hokkaido.

Habitat and Biology : A benthic shelf species on sandy to muddy bottoms. It carries out seasonal migrations in response to changes in temperature, tending to alternate between deeper waters in summer and shallower waters in the colder season, but it usually occurs in depths greater than 100 m, so that there is relatively little overlap between the depth ranges of this species, O. dofleini (primarily shallower), and O. araneoides (occurring mostly deeper than 200 m). Mating takes place during the inshore migration. Egg numbers increase with size of females and fluctuate between about 700 and 1 200 (egg diameter ranging between 1.7 and 2.2 mm). The eggs are deposited on the seafloor and brooded by the females throughout the incubation period. During this period females starve and usually die a few days afterwards. The lifespan of this species is assumed to be 3 or 4 years.



Size : Maximum total length 150 cm and weight 4 kg. Females grow larger than males.

Interest to Fisheries : Abundantly caught by trawl, bottom longline and trap in northern Japan and as bycatch in the Soviet bottom trawl fishery in the Japan Sea and around the southern Kuril Islands. It is the second most abundant species in the market of Hokkaido, next to O. dofleini, but separate statistics are not reported.

Local Names : JAPAN: Yanagi dako.

Literature : Osako & Murata (in press, resources).

Octopus cyaneus Gray, 1849

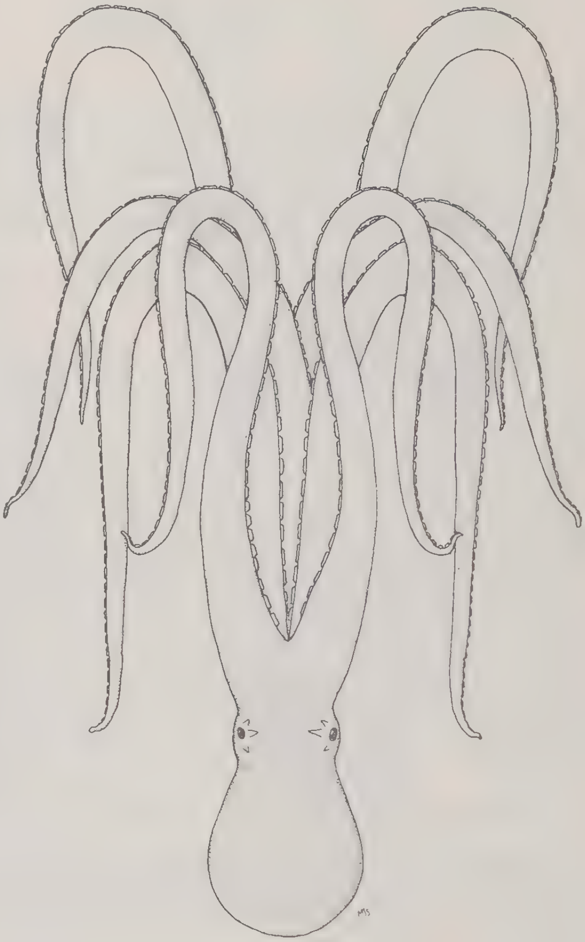
OCT Oct 9

Octopus cyanea Gray, 1849, Cat.Moll.Brit.Mus., 1:15.

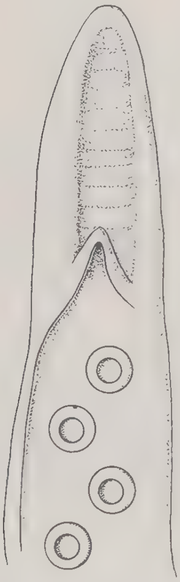
Synonymy : Octopus marmoratus Hoyle, 1885; Joubin, 1894; Berry, 1909; Octopus horsti Joubin, 1898.

FAO Names : En - Big blue octopus
Fr - Gros poulpe bleu
Sp - Pulpo azulón

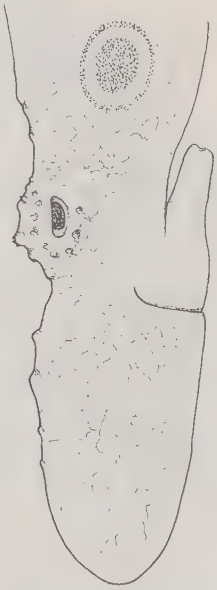
Diagnostic Features : A large octopus. Mantle round to oblong, smooth-skinned (non-papillose) with a few large tubercles; one large cirrus over each eye, usually with 2 secondary, smaller tubercles; a dark purplish, ringed ocellus or "eye spot" located on web on each side between the eye and the base of arms III and IV. Arms stout, robust, coequal, arms IV slightly longer; right arm III hectocotylized: calimus and ligula very small (0.4 to 1.4% of arm length); ligula groove shallow with about 10 often obscured transverse ridges; About 10 filaments on outer demibranch of gill. Colour: mantle mottled, reticulate, arms with purple-brown blotches.



dorsal view



tip of hectocotylized right arm III of male

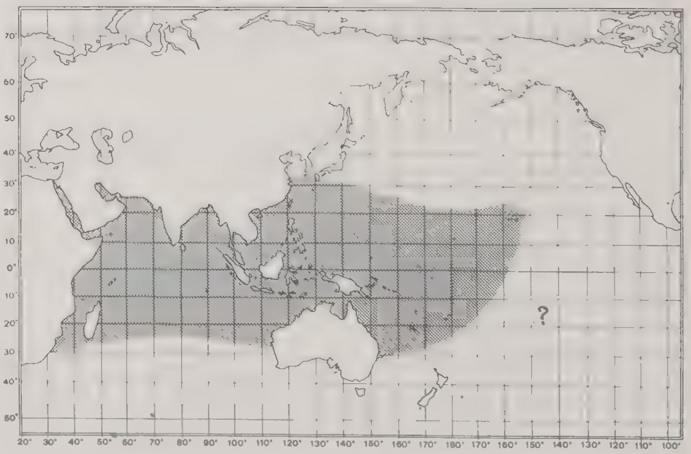


lateral view of body and head

Geographical Distribution : Throughout the Indo-Pacific region: East Africa to Hawaiian Islands in tropical and warm waters including the Red Sea, India and Australia.

Habitat and Biology : A benthic species occurring in shallow waters on coral reefs. Unlike many other octopuses, it hunts during daylight hours.

Size : Maximum total length 120 cm and weight 4 kg.



Interest to Fisheries : It is taken throughout its range in local and subsistence fisheries, especially with traps; also speared at night, using light attraction devices. It is probably the most important of the reef-dwelling species. Used for human consumption.

Local Names : USA: Hawaii: He'e.

Octopus defilippi Verany, 1851

OCT Oct 10

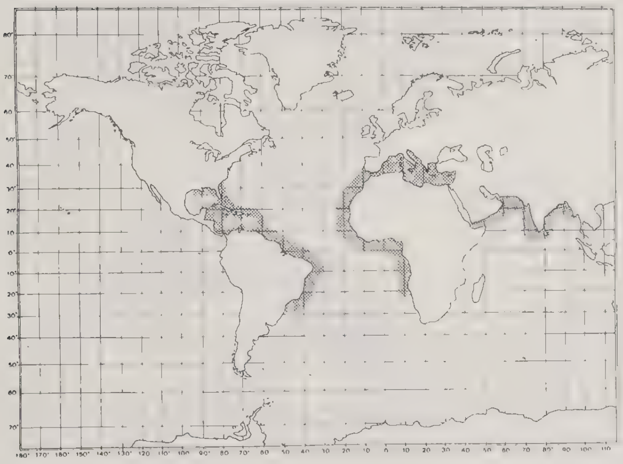
Octopus defilippi Verany, 1851, Mollusques Méditerranéens, 1:30, pl. 11.

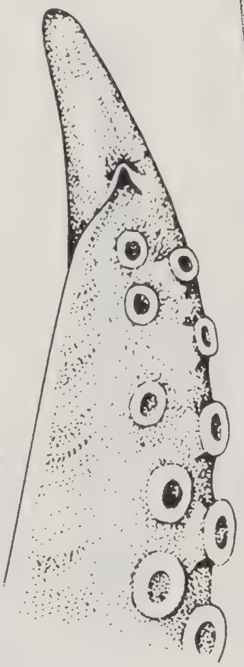
Synonymy : Macrotritopus species.

FAO Names : En - Lilliput longarm octopus
Fr - Poulpe à longs bras
Sp - Pulpito patilargo

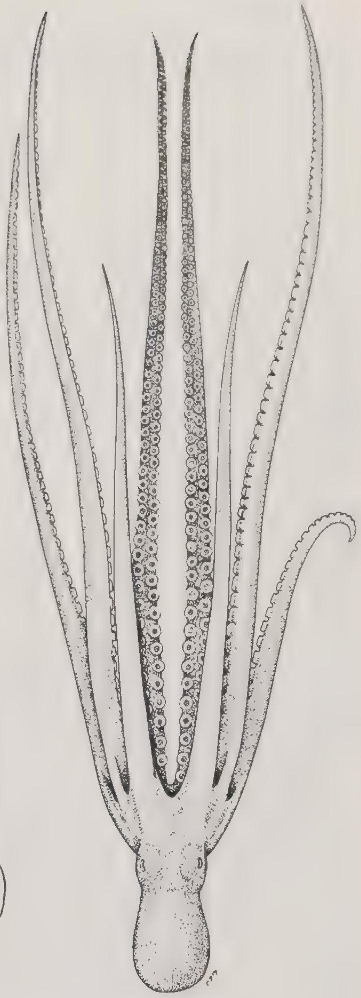
Diagnostic Features : Mantle relatively very small, smooth-skinned, no pigmented ocellus, spot, or ring. All arms very long, slender, asymmetrical; arms II and III longest; right arm III hectocotylized, very short, with ligula 1.8 to 2.5% of arm length, groove very shallow, calimus very small. Eleven gill lamellae on outer demibranch.

Geographical Distribution : Mediterranean Sea; eastern Atlantic from Morocco to Angola, Cape Verde Islands; western Atlantic: Bahamas, Gulf of Mexico, Caribbean Sea to Brazil; Indian Ocean: Arabian Peninsula to Burma.





tip of hectocotylized right arm III of male



dorsal view

Habitat and Biology : A little known benthic species taken on sandy to muddy bottom from 6 to 60 m depth, but occasionally reported down to 200 m. Its larvae and juveniles are pelagic (called "Macrotritopus larva") and characterized by extremely long arms III. Females lay over 10 000 small eggs (2.1 mm long) that may be brooded in the arms.

Size : Maximum mantle length 9 cm.

Interest to Fisheries : Taken only as bycatch to demersal fisheries directed at other species.

Local Names : ITALY: Polpessa di rena; SPAIN: Pulpo judio; USA: Lilliput longarm octopus.

Octopus dofleini (Wulker, 1910)

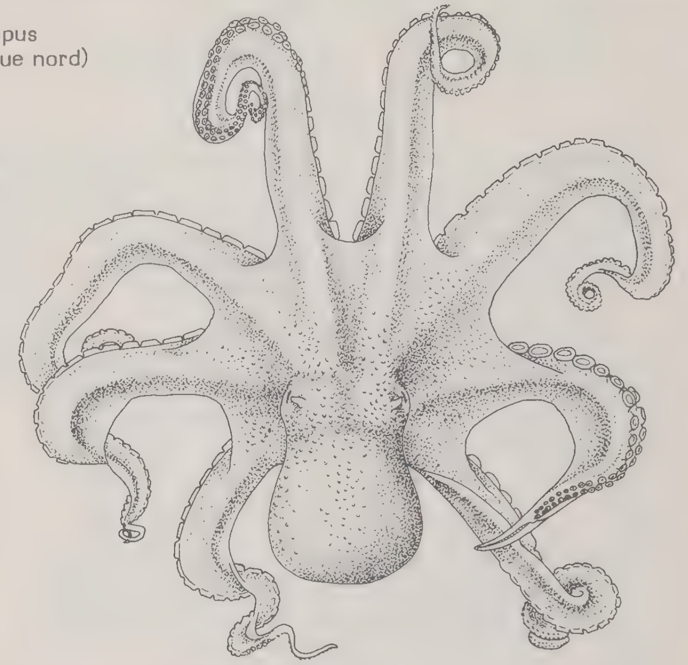
OCT Oct 11

Polypus dofleini Wulker, 1910, Abh.Bayer.Akad.Wissen., 3(Suppl.1):7.

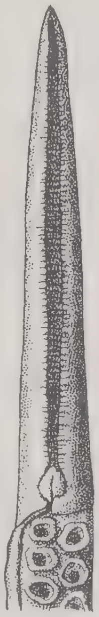
Synonymy : Polypus dofleini Wulker, 1910; Octopus dofleini apollyon (Berry, 1912); Octopus hongkongensis Hoyle, 1885; O. gilbertianus (Berry, 1912); O. punctatus Gabb, 1862.

FAO Names : En - North Pacific giant octopus
Fr - Poulpe géant (du Pacifique nord)
Sp - Pulpo gigante

Diagnostic Features : Animal gigantic, the largest of all octopods. Mantle ovate, soft, skin loose, warty, warts often connected with ridges; warts coarser, stelliform in young; 3 or 4 cirri over each eye; web well developed, depth up to 1/4 the way out the arms. Arms thick, long, arms I to III coequal, arms IV shortest; right arm III very prominently hectocotylized, with the ligula occupying 16 to 25% of total length of arm; ligula tapers to blunt terminus; groove depth with numerous fine striations (laminae); calimus small, acute; 24 to 30 gill lamellae (total count).



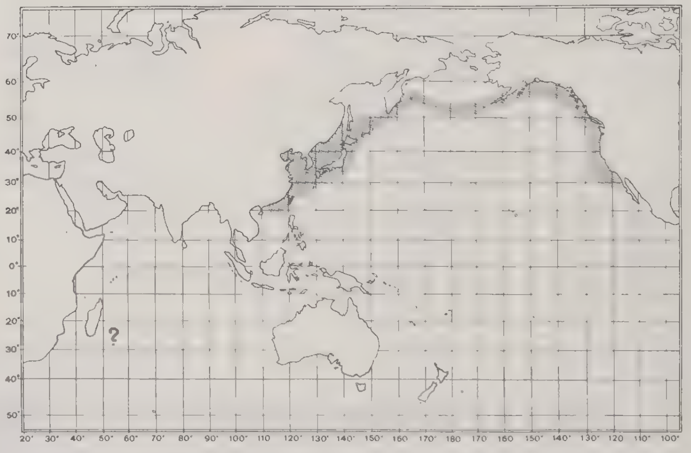
dorsal view



tip of hectocotylized right arm III of male

Geographical Distribution : North Pacific: northern California northward through Alaska to Japan.

Habitat and Biology : A benthic, shallow water species occurring from the low tide level to about 200 m depth. Medium to large-sized octopuses are known to migrate seasonally off Japan. They approach the coast between October and November, return to deeper waters from February to March, migrate inshore again in late April and May forming aggregations in June and July, and then migrate back to deeper waters through August and September. Mating takes place during the autumn inshore migration in waters of less than 100 m depth with the males transferring their enormous spermatophores (up to 115 cm long) to the females. Males move back to deeper waters and die several months later, while females continue migrating into shallower waters. Depending on their size, females may produce between 30 000 and 60 000 eggs which are deposited in May and June in nests on rocky or sandy bottoms, less than about 50 m deep. The eggs are brooded by the females during the 6 or 7 months prior to hatching. During this period females almost cease feeding and die shortly afterwards. Hatchlings measure about 10 mm total length. They are planktonic until they reach about 20 to 50 mm total length, and thereafter become benthic (by about March of the following year). They reach adult size (minimum 10 kg weight) in about 3 years. Their lifespan varies between 3 and 4 years.



Size : Maximum total length 300 cm (500 cm?); maximum weight 50 kg; common between 2 and 10 kg. Females mature at about 10 kg; they grow larger than males.

Interest to Fisheries : The most common species of octopuses in northern Japan. Since the beginning of the fisheries off Hokkaido, in 1955, about 20 000 metric tons are being caught per year (including minor quantities of O. conispadiceus and O. araneoides) (Osako & Murata, in press). It is fished from May to August in shallower waters; down to 60 m depth with wooden traps and from December to February; in depths between about 70 and 150 m with longlines from April to July and from November to February with modified trolls, trailed over the bottom. In the eastern Pacific, giant octopus is taken incidentally in trawl fisheries. The Californian catch is very low and scattered. Fishing depth in the Bering Sea used to be about 40 to 50 m in October but is gradually becoming deeper in recent years (possibly in response to changing hydrographical conditions). The species is used locally for human consumption and as bait in longline fisheries.

Local Names : JAPAN: Mizo dako; USA: North Pacific giant octopus.

Literature : High (1977, distribution and notes on biology); Osako & Murata (in press, biology and fishery, Japan).

Octopus dollfusi Robson, 1928

OCT Oct 12

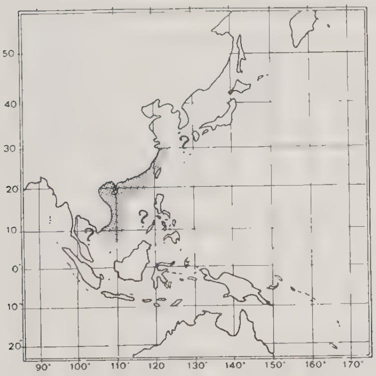
Octopus dollfusi Robson, 1928, *Serv.Oceano.Pêches Indo.*, 10:43.

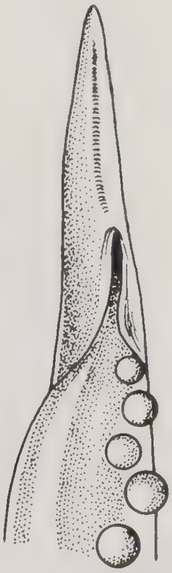
Synonymy : None.

FAO Names :
En - Marbled octopus
Fr - Poulpe nain
Sp - Pulpo marmóreo

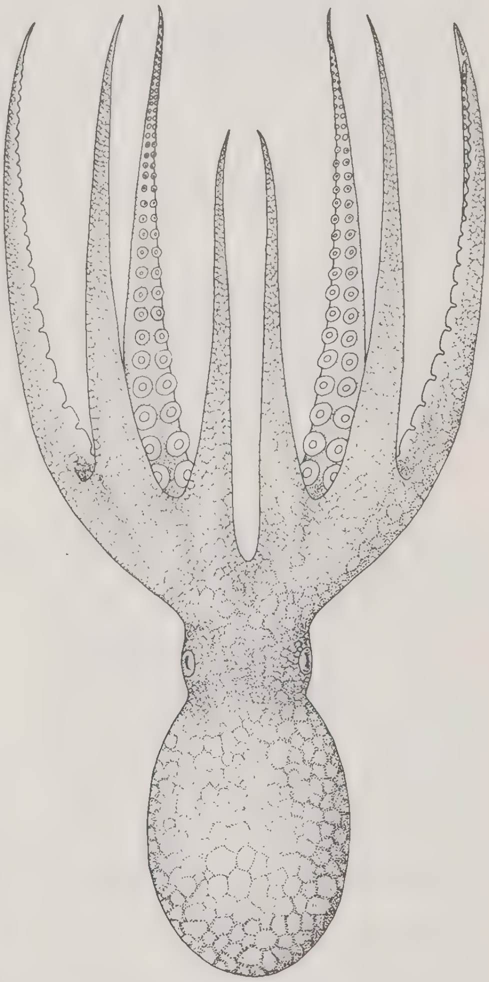
Diagnostic Features : Mantle oblong to elongate oval. Head small with inconspicuous eyes; no eye cirrus. Arms moderately long and stout, dorsal arms much the shortest; mantle, head, and arms covered dorsally with numerous, large warts interspersed with smaller papillae, each unit bordered by a darkly pigmented line, giving a distinct reticulate pattern; right arm III hectocotylized: spermatophoric groove very strong, ligula 8 to 10% of arm length, elongate with a deep groove and well-developed calimus; a few enlarged suckers at bases of arms II and III in males; 8 or 9 lamellae per demibranch on the gills.

Geographical Distribution : Indo-China; Hong Kong; limits unknown.





tip of hectocotylized right arm III of male



dorsal view

Habitat and Biology : A benthic species living in holes in the bottom or inside empty mollusc shells in extremely shallow waters close to the coast down to a few metres depth.

Size : Maximum mantle length 9 cm, weight 0.2 kg.

Interest to Fisheries : In Hong Kong currently no commercial fishery; taken only as bycatch in demersal trawl fishery.

Local Names :

Literature : Voss & Williamson (1971, description).

Remarks : Closely related to *O. aegina*.

Octopus globosus Appellöf, 1886

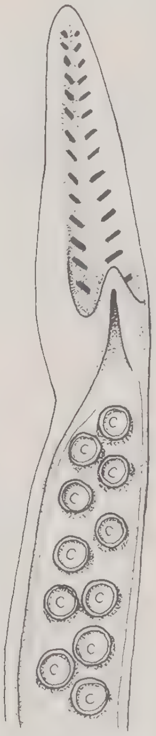
OCT Oct 13

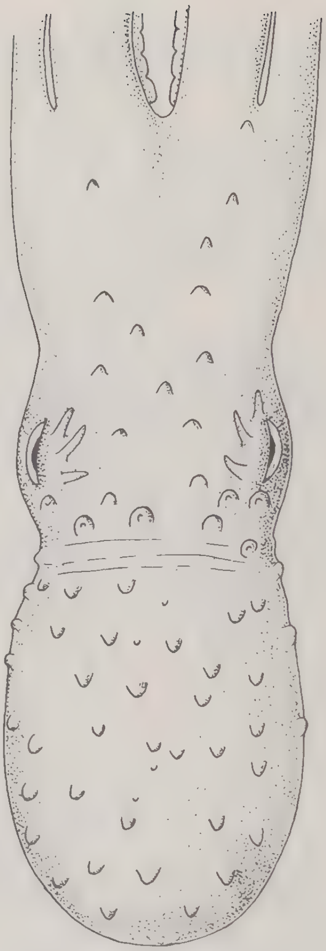
Octopus globosus Appellöf, 1886, Svenska Vet.Akad., 21(13):7.

Synonymy : None.

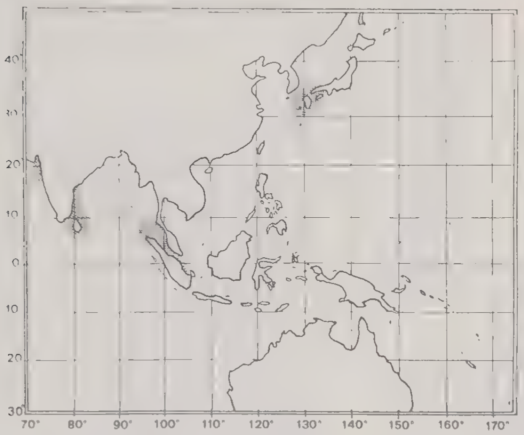
FAO Names :
En - Globe octopus
Fr - Poulpe globe
Sp - Pulpo globoso

Diagnostic Features : Mantle globular to slightly elongate; dorsal and lateral surface of mantle, head, and bases of arms covered with widely spaced conical warts of various sizes, skin smooth in between warts; 5 to 7 warts above and posterior to each eye of which 3 are elongated into cirri. Arms moderately long, arms I the longest, arms IV the shortest; right arm III hectocotylized, only 2/3 as long as left III; ligula about 15% of arm length, elongate-conical, with a broad, deep groove that has a median pinnate ridge with about 15 alternating side-arms and depressions on each side; calimus well-developed, relatively long; 17 to 19 lamellae (total count) in each gill.


tip of hectocotylized right arm III of male


dorsal view of body and head

Geographical Distribution : Scattered reports from Japan to India.



Habitat and Biology : A littoral species.

Size : Maximum total length 25 cm, sexually mature at about 19 cm.

Interest to Fisheries : Reported as one of the main commercial cephalopod species in India; along the southeastern coast longlines of hundreds of Pterocera shells are set out for Octopus species, which are used as bait for longline fishing for seerfish, carangids, sharks and rays.

Local Names :

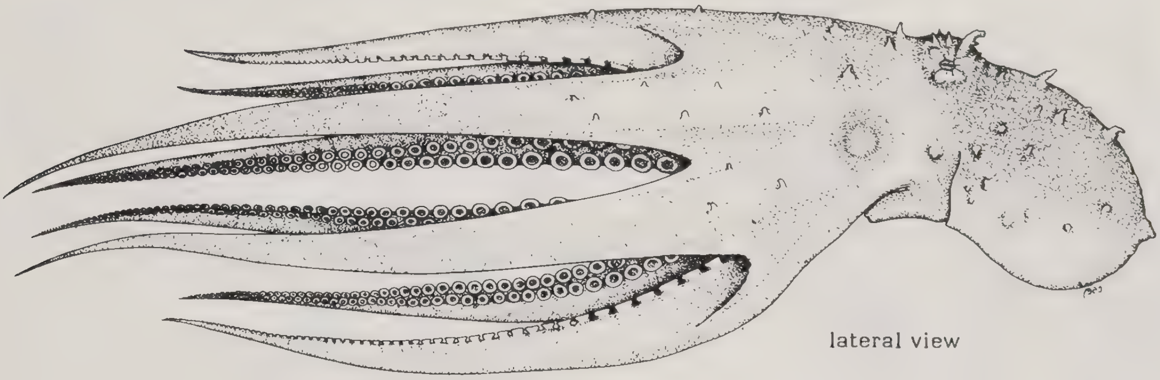
Literature : Voss (1973, resources).

Octopus hummelincki Adam, 1936

Octopus hummelincki Adam, 1936, Bull.Mus.R.Hist.Nat.Belg., 12:1.

Synonymy : Octopus filosus Howell, 1868; Octopus rugosus Robson 1929 (in part).

FAO Names :
En - Bumblebee octopus
Fr - Poulpe bourdon
Sp - Pulpo abejorro



lateral view

Diagnostic Features : A very small species. Mantle globular to oval, usually covered with conspicuous papillae; a vivid dark iridescent blue ocellus occurs on the web at the base of arms II and III anterior to the eyes; several papillae or cirri over each eye. Arms relatively long and robust; a few suckers on arms II and III enlarged in males; right arm III hectocotylized; ligula short, small, length 2 to 6% of arm length, with a very shallow spoon-like groove; calimus acute with a deep spermatophore groove; 5 to 9, mostly 6 to 7, filaments on outer demibranch of gill.

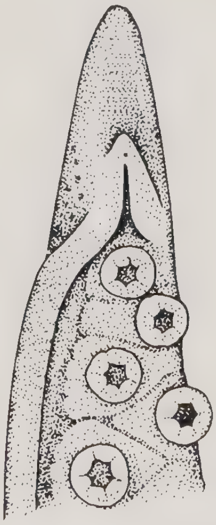
Geographical Distribution : Tropical western Atlantic: Caribbean, Florida and Bahamas to Brazil.

Habitat and Biology : This small benthic species occurs from very shallow waters, where it is associated with coral reefs, down to 200 m depth on sand and gravel bottom, often associated with calcareous algae, and shell rubble.

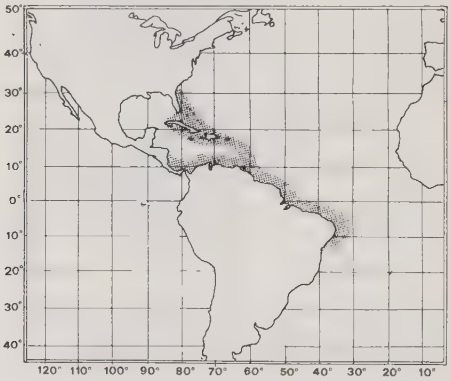
Size : Maximum mantle length 7 cm, mostly 2 to 3 cm.

Interest to Fisheries : None at present.

Local Names : USA: Bumblebee octopus.



tip of hectocotylized right arm III of male



Octopus joubini Robson, 1929

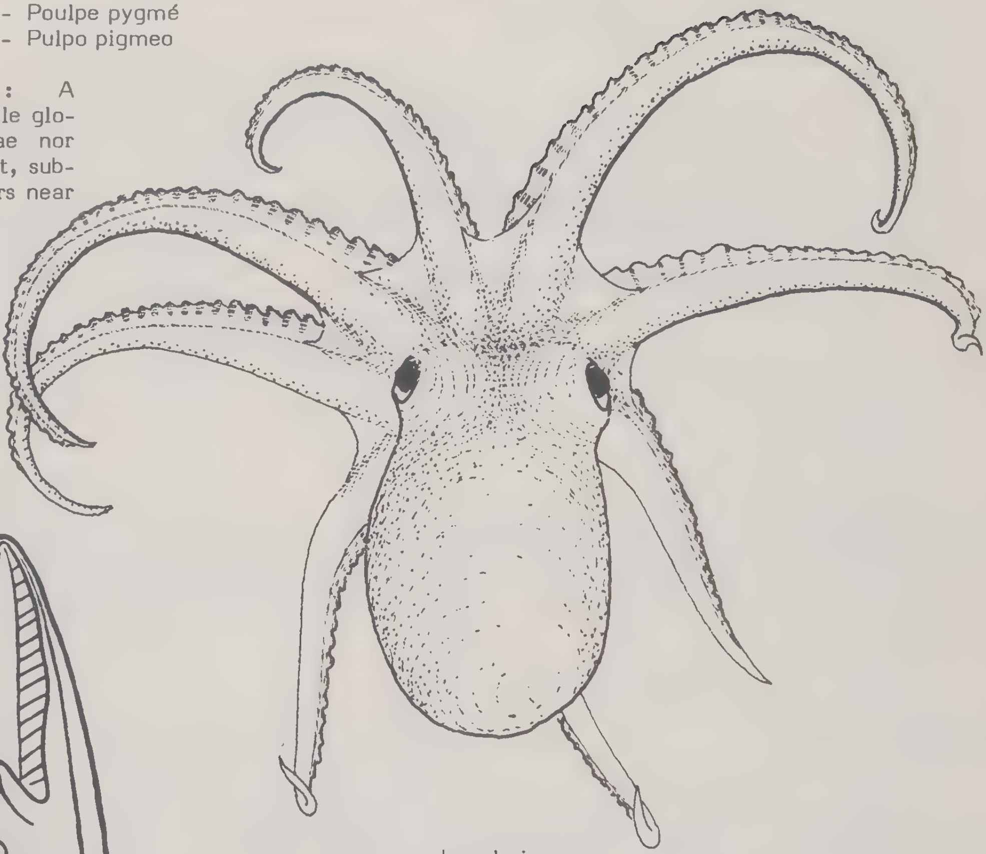
OCT Oct 15

Octopus joubini Robson, 1929, Mono.Rec.Ceph., 161.

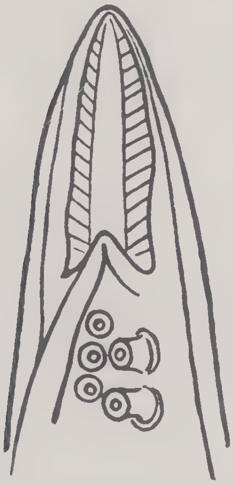
Synonymy : None.

FAO Names :
En - Pygmy octopus
Fr - Poulpe pygmé
Sp - Pulpo pigmeo

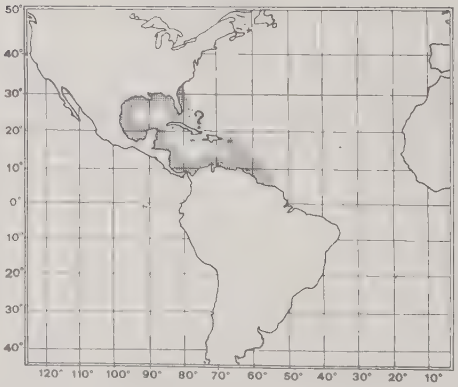
Diagnostic Features : A very small species. Mantle globular, smooth, no ocellae nor papillae. Arms very short, subequal, small; some suckers near base of arms II and III of males conspicuously enlarged; right arm III hectocotylized, shorter than left III; ligula 4 to 7% of arm length, groove shallow with a few transverse ridges; calimus small; 5 to 7 gill lamellae.



dorsal view



tip of hectocotylized right arm III of male



Geographical Distribution : Tropical western Atlantic: Florida, Gulf of Mexico, Caribbean Sea to Guyanas.

Habitat and Biology : A benthic, shallow-water species occurring on sandy and hard coral and rubble bottoms down to about 80 m depth. It frequently hides in bivalve shells. Spawning takes place in 2 periods, the first between November and January, and the second between April and June. The females lay their about 10 mm long eggs in clam shells and brood them. The hatchlings settle immediately in the benthic adult habitat.

Size : Maximum total length 15 cm.

Interest to Fisheries : No commercial fishing exists due to the very small size of the species. It is, however, believed to have potential for mariculture.

Local Names : USA: Pygmy octopus.

Remarks : It has been cultured through five generations. Excellent for behavioural and biomedical research.

Octopus lobensis Castellanos & Menni, 1969

OCT Oct 16

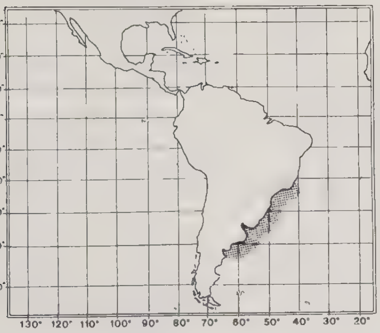
Octopus lobensis Castellanos & Menni, 1969, Neotropica, 15(47):92.

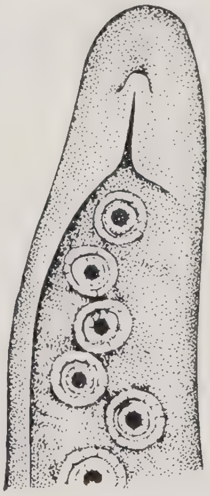
Synonymy : None.

FAO Names : En - Lobed octopus
Fr - Poulpe séganliou
Sp - Pulpo lobero

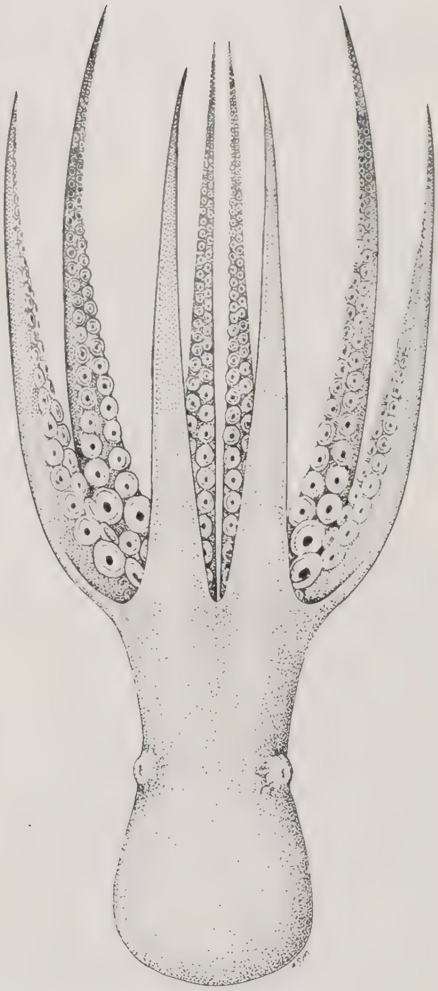
Diagnostic Features : Mantle broad, short, globular, its width 71 to 110% of its length; head and arms broad; funnel organ distinctly VV-shaped. Arms moderately long, very robust at bases; one or two suckers on the 7th or 8th row out; arms II and III greatly enlarged in both males and females; right arm III hectocotylized in males only slightly shorter than left III; ligula very small, indistinct (1.5% of arm length), bluntly rounded, with an indistinct, shallow groove; calimus small, rounded. Five to 11 gill filaments on outer demibranch.

Geographical Distribution : Southwest Atlantic between 13°N and 42°N, entering the Patagonian region.





tip of hectocotylized
right arm III
of male



dorsal view

Habitat and Biology : A benthic species occurring in shallow waters down to 60 to 80 m depth; the eggs are about 9 mm long.

Size : Maximum mantle length 10 cm.

Interest to Fisheries : Currently taken as bycatch in trawl fisheries.

Local Names :

Remarks : Sympatric with O. tehuelchus, with which it is probably often confused.

Octopus macropus Risso, 1826

OCT Oct 2

Octopus macropus Risso, 1826, Hist.nat.Europe Méridion., 4:3.

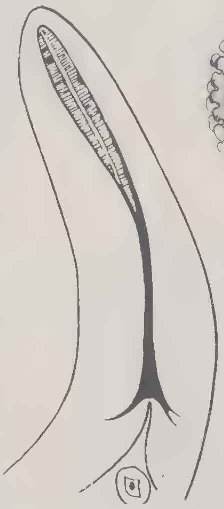
Synonymy : Octopus cuvieri - Orbigny, 1840; Octopus longimanus - Orbigny, 1840; Octopus bermudensis - Hoyle, 1885; Octopus chromatus Heilprins, 1888.

FAO Names : En - White-spotted octopus
Fr - Poulpe tacheté
Sp - Pulpo manchado

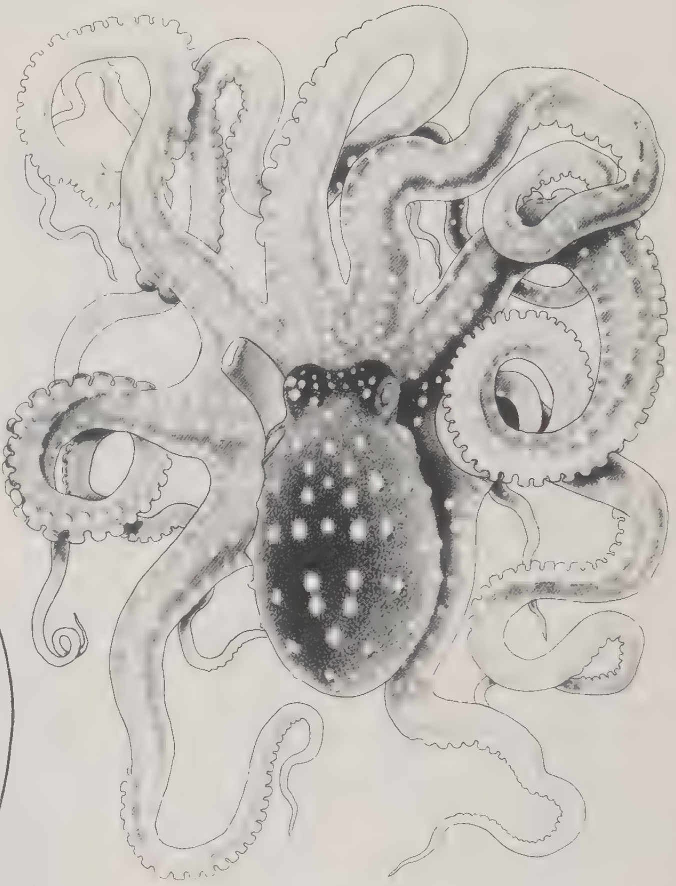
Diagnostic Features : Dorsal pair of arms I longest and stoutest (or coequally stoutest with arms II; right arm III of males hectocotylized by modification of tip to a large stout, tubular ligula; ligula index (length of ligula expressed as percentage of length of hectocotylized arm) up to 14; 9 to 13 gill lamellae on outer side of gill. Colour: conspicuous white spots on reddish background

Geographical Distribution : Worldwide in warm to warm-temperate waters.

Habitat and Biology : A benthic, shallow-water species occurring in coral reefs, reef flats and on open bottoms. In the western central Atlantic, the spawning season extends from winter into early spring. Hatchlings are first planktonic, settling to the bottom after a short time. The lifespan of this species probably does not exceed 1 year. It preys on crustaceans, molluscs and, occasionally, fishes.

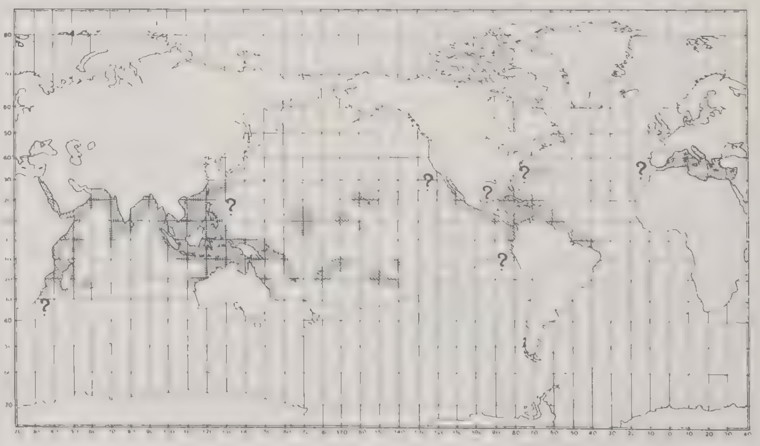


tip of hectocotylized right arm III of male



dorsal view

Size : Maximum total length from 120 to 150 cm; common to 60 cm; maximum mantle length 14 cm, weight 2 kg.



Interest to Fisheries : No large-scale fisheries are directed at this species, but it supports artisanal and subsistence fisheries in several regions, i.e. in the Philippines and the Mediterranean and Caribbean seas. Separate catch statistics are not available for this species, although it is suspected that it may be partially included in catch figures attributed to O. vulgaris. Fishing gears include spears, hooks and lures, trawls and traps. In the Caribbean and northern South America it is marketed fresh; in other areas it may also be marketed frozen and dried-salted as O. vulgaris.

Local Names : CHINA: Sui gwai (Water ghost); CYPRUS: Octapodi; FRANCE: Poulpe; GREECE: Khtapódi; ITALY: Polpessa; MALTA: Frajjel; MOROCCO: Poulpe; SPAIN: Pulpo patudo; TUNISIA: Qarnit kbir; TURKEY: Ahtapot; USA: White-spotted octopus; USSR: Osminog; YUGOSLAVIA: Tracan.

Literature : Voss & Williamson (1971, Hong Kong); Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31); Chikuni (in press, resources).

Remarks : Occasionally confused with Cistopus indicus, but can be distinguished by sculpture, lack of water pores, and the large ligula in the male.

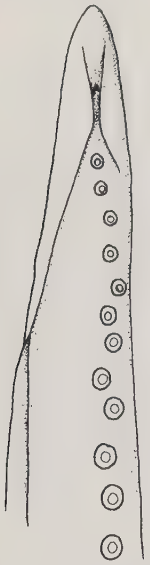
Octopus maya Voss & Solis, 1966

OCT Oct 4

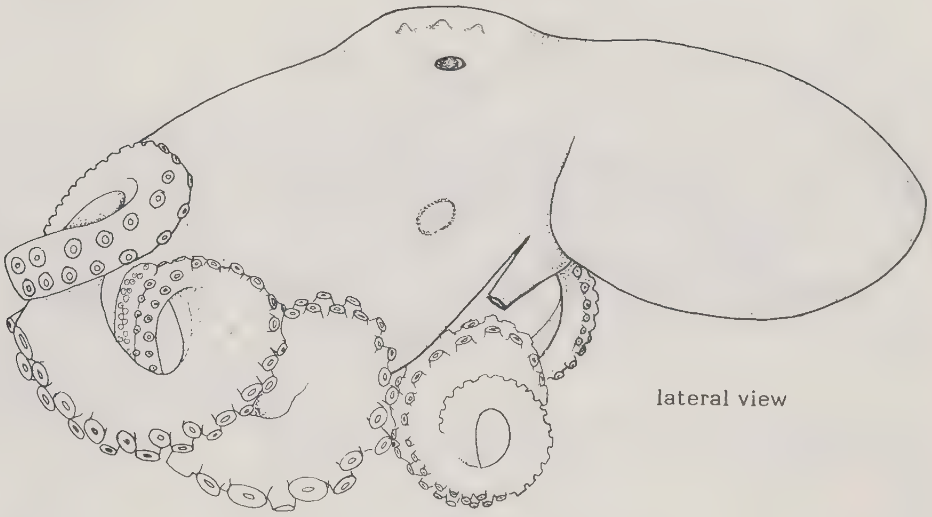
Octopus maya Voss & Solis, 1966, *Bull.Mar.Sci.*, 16(3):617.

Synonymy : None.

FAO Names : En - Mexican four-eyed octopus
Fr - Poulpe mexicain
Sp - Pulpo mexicano



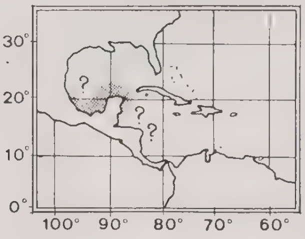
tip of hectocotylized right arm III of male)



lateral view

Diagnostic Features : A large, round dark "eyespot" (ocellus) between eye and base of arms II and III on each side of head. Arms long with attenuate tips; right arm III in males shortened, hectocotylized by modification of tip into a small, smooth spoon-shaped ligula with inrolled edges; ligula index (length of ligula expressed as percentage of length of hectocotylized arm) 1.4 to 1.9. Nine or 10 gill lamellae on outer side of gill.

Geographical Distribution : Western Atlantic: coasts of Yucatan and Campeche, Mexico in the Gulf of Mexico.



Habitat and Biology : A benthic, shallow-water species occurring in seagrass beds, empty shells and crevices down to 50 m depth. The spawning season extends from November to December; females deposit 1 500 to 2 000 large eggs (up to 17 mm long) in festoons in crevices or empty mollusc shell in September/October and brood them during the incubation period of 50 to 65 days. The large hatchlings settle immediately to benthic life. Longevity is about 1 to 2 years. The species feeds on crabs (such as the stone crab, *Menippe mercenaria*), gastropods (i.e. *Nerita*) and fishes. It is in turn preyed upon by groupers (Serranidae) and Spanish mackerels (Scombridae).

Size : Maximum total length 130 cm, weight 5 kg.

Interest to Fisheries : In the Bay of Campeche, this species is taken between June and December on crab-baited lines, in pots, with artificial lures and dipnets. In shallow waters, it is also hooked or speared. Separate statistics are not reported, but it may at least partially have been included in Mexico's catch figures for *O. vulgaris* reported as 6 877 metric tons in 1981 (FAO, 1983). The species is marketed fresh for human consumption and as bait.

Local Names :

Literature : Solis (1967, biology); Voss (1971, resources); Van Heukelem (1977, breeding and rearing); Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31).

Remarks : This species has been reared through several generations in the laboratory and is an ideal experimental animal due to the large size of the eggs.

Octopus membranaceus Quoy & Gaimard, 1832

OCT Oct 17

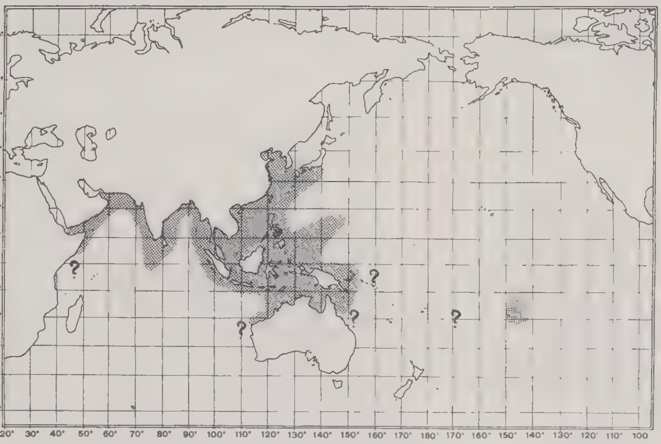
Octopus membranaceus Quoy & Gaimard, 1832, Zool. Astrolabe, 2:89.

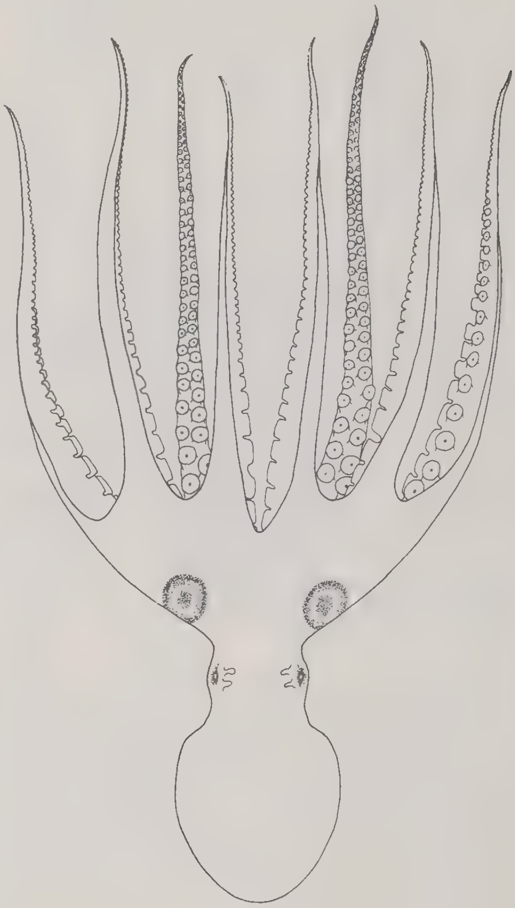
Synonymy : Octopus fang-siao Orbigny, 1840 (in 1834-1848); Octopus ocellatus Gray, 1849.

FAO Names : En - Webfoot octopus
Fr - Poulpe à quatre yeux
Sp - Pulpo membranoso

Diagnostic Features : Mantle saccular to elongate, sculptured with small, close-set tubercles over head, mantle, and arms; 2 cirri or warts over each eye. Arms moderately long, robust; web low; a conspicuous, dark, ringed ocellus on web at base of arms II, anteroventral to the eyes; right arm III hectocotylized; ligula slender, long, 4 to 6% of arm length, with a groove; 7 or 8 filaments in outer demibranch of gill.

Geographical Distribution : Indo-Pacific: Indian Ocean to Japan, China, Philippines and southward to Australia.





dorsal view

Habitat and Biology : A benthic shallow-water species occurring down to about 60 m depth. It shows a strong cryptic behaviour and usually hides in holes on flat bottoms. The spawning season extends from December to February.

Size : Maximum total length 30 cm; mantle length 8 cm; weight 0.5 kg.

Interest to Fisheries : An important market species, supporting local fisheries throughout Japan (mostly in the Inland Sea) and in China. It is caught with small pots and as bycatch in shallow-water trawl fisheries throughout southeast Asian waters. Separate statistics are not reported.

Local Names : CHINA: Sei ngaan liu (Four-eyed bird); JAPAN: Ji dako.

Literature : Voss & Williamson (1971, Hong Kong); Chikuni (in press, resources, as O. ocellatus).

Remarks : The nomenclature is confused and unresolved; a species related to the Octopus areolatus-ocellatus complex.

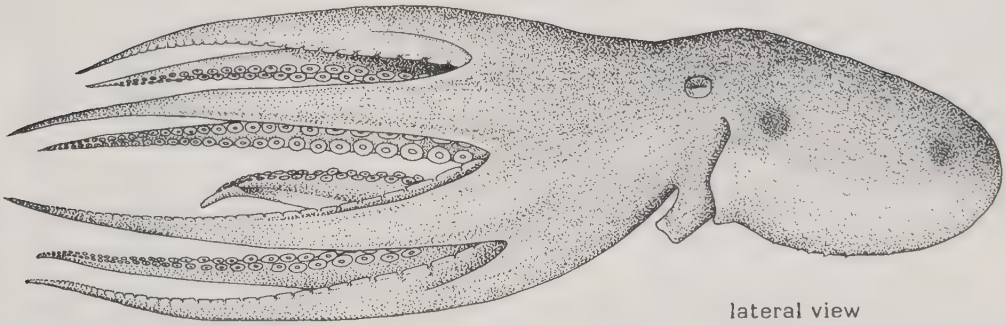
Octopus selene Voss, 1971

OCT Oct 18

Octopus selene Voss, 1971, Bull.Mar.Sci., 21(1):11.

Synonymy : None.

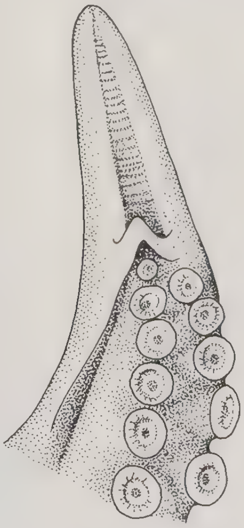
FAO Names : En - Moon octopus
Fr - Poulpe lune
Sp - Pulpo lunero



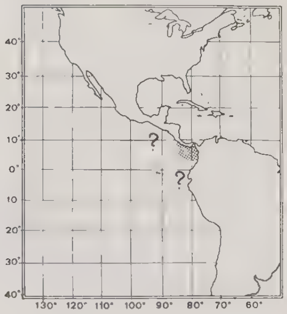
lateral view

Diagnostic Features : A medium-sized octopus. Mantle stout, rounded, with weak rugosity; web moderately shallow, extending 2/3 of length out arms. Arms of medium length; right arm III hectocotylized in males, shorter (by 25%) than left III; ligula small, narrow, pointed, with a distinct groove with transverse rugae; ligula length about 7.5% (5 to 10%) of arm length; calimus short, triangular; 12 to 16, mostly 13 to 14 lamellae on outer demibranch of gill. Colour: 4 dark pigment spots on dorsolateral surface of mantle.

Geographical Distribution : Tropical eastern Pacific; Gulf of Panama.



tip of hectocotylized right arm III of male)



Habitat and Biology : A benthic, shallow-water species occurring on sandy and rocky bottoms, in depths between 20 and 50 m.

Size : Maximum mantle length 6 cm, mostly 4 to 4.5 cm. Females attain larger sizes than males.

Interest to Fisheries : Some potential has been predicted for this species as it occurs on good trawlable bottom in the Gulf of Panama and appears to be very abundant in some areas (up to 1.5 specimens per square metre).

Local Names : PANAMA: Pulpo.

Literature : Voss (1967).

Octopus tehuelchus Orbigny, 1834

OCT Oct 19

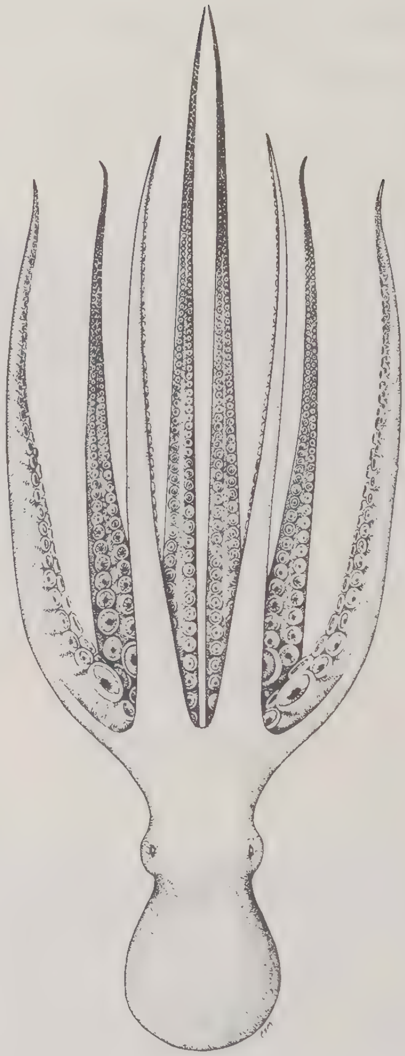
Octopus tehuelchus Orbigny, 1834, in 1834-1846, Voy.Amér.Mérid., 5(3):27.

Synonymy : None.

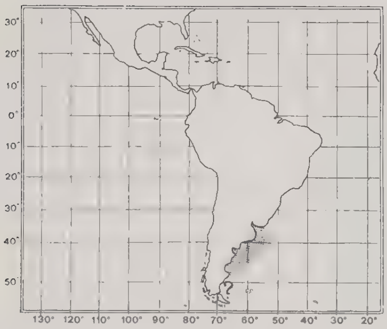
FAO Names : En - Tehuelche octopus
Fr - Poulpe téhuelche
Sp - Pulpo tehuelche

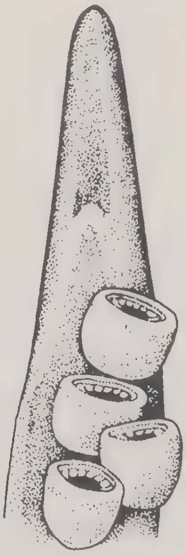
Diagnostic Features : A medium-sized species. Mantle globular, narrow; surface smooth with minute granulations around the eyes. Head slightly narrower than mantle; eyes prominent; neck constricted; mantle opening wide; funnel long, extends anterior to level of eyes; funnel organ thick, W-shaped. Arms moderate in length (66 to 76% of total length) and thickness, attenuate, subequal, arms IV longest, arms II shortest; enlarged suckers present in males only; right arm III hectocotylized in males, short (80% of left III); ligula medium-sized (3 to 6% of arm length), groove shallow; calimus small, smooth; 6 gill filaments on outer demibranch.

Geographical Distribution : Southern Brazil to Golfo San Jorge, Argentina (50°S). Unconfirmed to Patagonia and Falkland (Malvina) Islands.



dorsal view





tip of hectocotylized
right arm III
of male

Habitat and Biology : A benthic, shallow-water species occurring down to 90 m depth.

Size : Maximum total length 20 cm.

Interest to Fisheries : Bycatch to trawl fisheries and of local interest.

Local Names : BRAZIL: Pulpo.

Literature : Palocio (1977, Brazil).

Remarks : Much information is needed for this species.

Octopus tetricus Gould, 1852

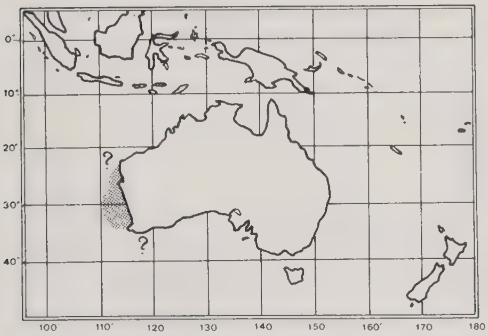
Octopus tetricus Gould, 1852, U.S.Explor.Exped., 12:474.

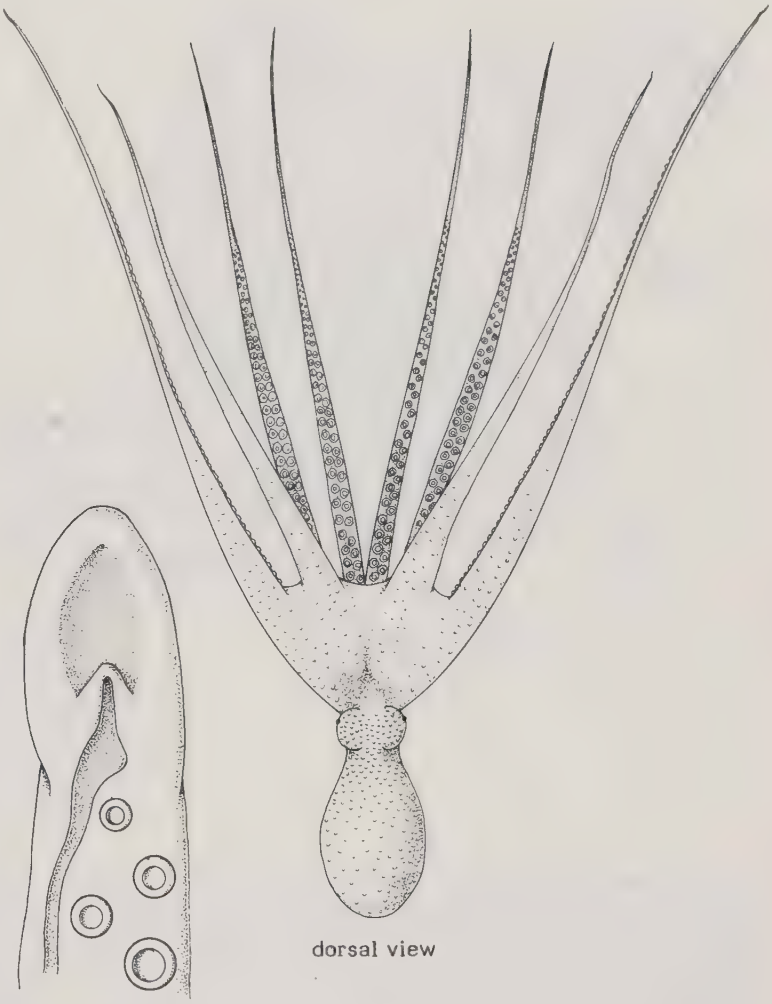
Synonymy : Octopus boscii Gray, 1849.

FAO Names :	En - Gloomy octopus
	Fr - Poulpe sombre
	Sp - Pulpo tétrico

Diagnostic Features : A relatively large species. Mantle saccate; neck constricted. Arms very long and attenuate, comprising 80 to 90% of the total length of the animal; depth of web 1/5 to 1/4 of arm length; skin covered with conical rosette-shaped tubercles with erect central knobs; funnel organ W-shaped; right arm III hectocotylized, shorter than left III; ligula very small (1.5% of arm length), leaf-shaped, with a wide, shallow groove; 9 or 10 filaments in outer demibranch of gill.

Geographical Distribution : Eastern Indian Ocean: temperate coastal waters of southwestern Australia, exact range undetermined.





dorsal view

tip of hectocotylized right arm III of male

Habitat and Biology : A benthic, shallow-water species occurring from the intertidal zone down to about 60 m depth. There is at least one, rather prolonged, breeding season. The eggs are small and hatch into planktonic larvae. Females die after the hatching of the eggs. The species feeds on crabs and molluscs.

Size : Maximum total length 80 cm; females recorded to 3 kg.

Interest to Fisheries : Initially, this octopus was considered an unwellcome bycatch in the valuable western Australian rock lobster industry, since it would enter the pots and eat the rock lobsters (Panulirus longipes). In the 1975/76 season, the losses due to octopus were conservatively estimated at about $ 400 000. While this bycatch was initially only used as bait, a directed octopus fishery has been developing recently, aimed in particular at the Japanese seafood market. Catches are best between January and June.

Local Names : AUSTRALIA: Octopus.

Literature : Joll (1977, octopus predation on rock lobster).

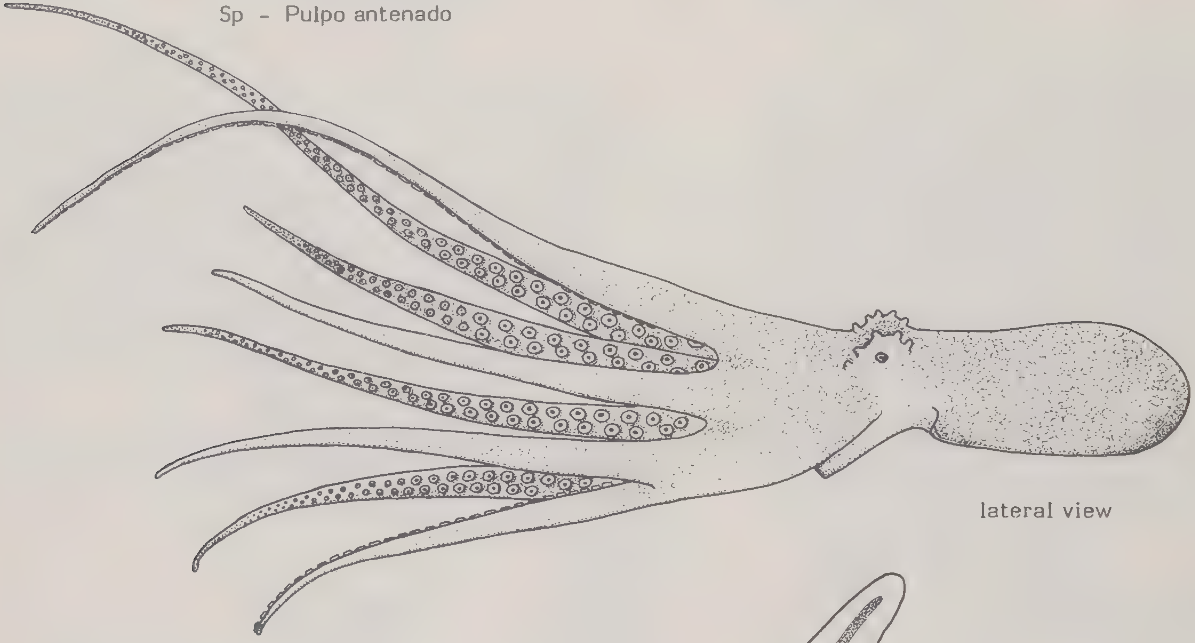
Octopus variabilis (Sasaki, 1929)

OCT Oct 21

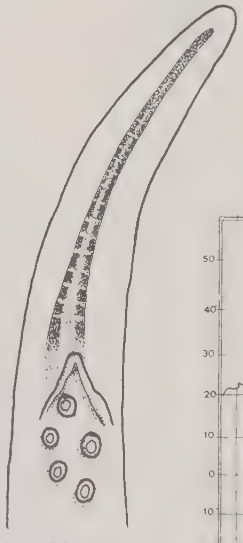
Polypus variabilis var. typicus Sasaki, 1929, J.Coll.Agr.Hokkaido Imp.Univ., 20:90.

Synonymy : Polypus variabilis Sasaki, 1929..

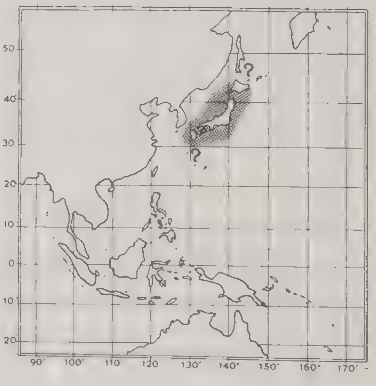
FAO Names : En - Whiparm octopus
Fr - Poulpe fouet
Sp - Pulpo antenado



lateral view



tip of hectocotylized right arm III of male



Diagnostic Features : Mantle elongate, oval, up to twice as long as broad; skin covered with variable-sized warts and papillae; 5 to 8 cirri over each eye, one quite enlarged; neck strongly constricted; web very low. Arms very long, unequal, arms I longest, up to 2 times longer than arms III or IV; male with some considerably enlarged suckers; right arm III hectocotylized, at maturity only half as long as left III; ligula large, conspicuous (1/4 to 1/7 the length of the arm), terminally rounded; groove deep with 10 to 14 strong transverse ridges and grooves; calimus relatively large, bluntly pointed, conical; 20 to 24 lamellae (total count).

Geographical Distribution : Western Pacific Ocean: Japan; limits unknown.

Habitat and Biology : A benthic, littoral species occurring down to about 200 m depth around Japan.

Size : Maximum mantle length 10 cm total length 70 cm; sexually mature at about 50 cm total length.

Interest to Fisheries : The species is important in the Japanese fishery off Honshu. It is also one of the three species reported in the Chinese octopus catch. No separate statistics are available.

Local Names :

Octopus vulgaris Cuvier, 1797

OCT Oct 1

Octopus vulgaris Cuvier, 1797, *Tabl.élém.hist.nat.*, 380.

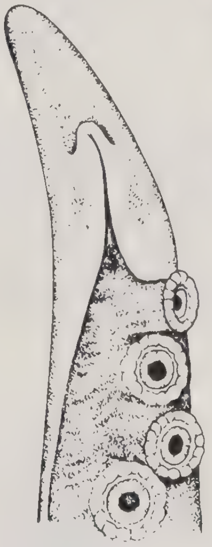
Synonymy : *Octopus vulgaris* Lamarck, 1798.

FAO Names :
En - Common octopus
Fr - Pieuvre
Sp - Pulpo común

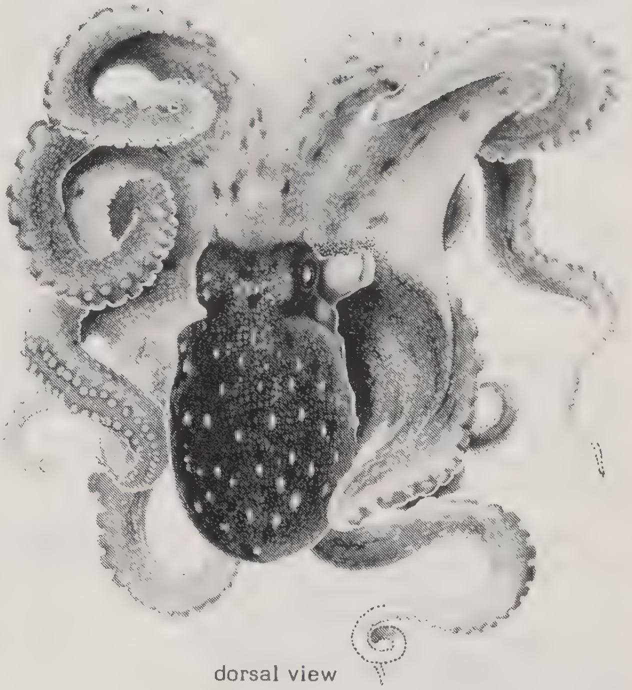
Diagnostic Features : Medium to large-sized; animal chunky in appearance. Arms stout, of about equal length and thickness, dorsal pair of arms slightly shorter; shortened right arm III of males hectocotylized by modification of tip into a very small, spoon-shaped ligula; ligula index (length of ligula expressed as percentage of length of hectocotylized arm) less than 2.5; 7 to 11 gill lamellae on outer side of of gill, including terminal lamella.

Geographical Distribution : Worldwide in temperate and tropical waters; limits unknown.

Habitat and Biology : A benthic, neritic species occurring from the coastline to the outer edge of the continental shelf (in depths from 0 to 200 m), where it is found in a variety of habitats, such as rocks, coral reefs, and grass beds. It is inactive in waters of 7°C and colder.

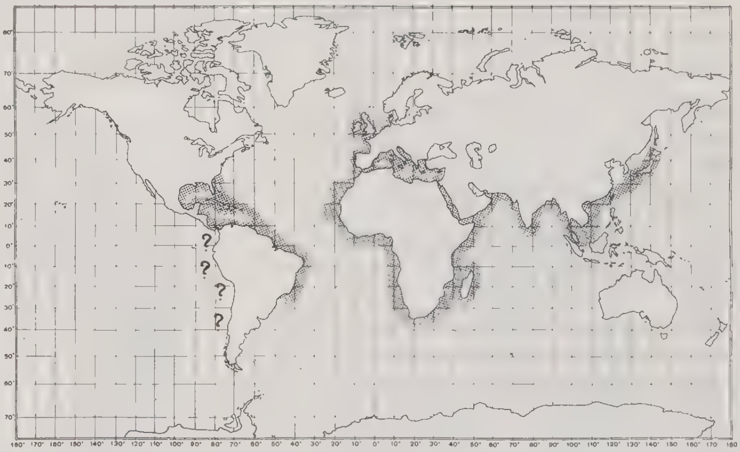


tip of hectocotylized right arm III of male



dorsal view

Throughout its distribution range, this species is known to undertake limited seasonal migrations, usually overwintering in deeper waters and occurring in shallower waters during summer. In the western Mediterranean, large mature or maturing individuals migrate inshore in early spring, followed lateron by smaller, immature individuals. These two groups begin their retreat into deeper waters by August/September and November/December respectively. Similar migration patterns are found in other sea areas.



Two spawning peaks per year can be observed for this species throughout its distributional range: in the Mediterranean and the Inland Sea of Japan, the first occurs in April/May, corresponding to the group migrating inshore in spring (most important in the Mediterranean) and the second in October, corresponding to the group migrating in autumn (most important in Japan); off West Africa, around Cape Blanc, the first spawning peak occurs in May/June and the second (more important) in September.

Females may produce between 120 000 and 400 000 eggs little longer than 2 mm, which they deposit in strings in crevices or holes, usually in shallow waters. Spawning may extend up to 1 month. During the brooding period (25 to 65 days), females almost cease feeding and many die after the hatching of the larvae. The hatchlings are pelagic, but settle to benthic life after about 40 days at a minimum size of approximately 12 mm. In the Inland Sea of Japan, common octopus reaches about 1 kg weight in 4 months; in the western Mediterranean it grows from 3 to about 20 cm in 17 months. A von Bertalanffy growth expression is given for the Mediterranean and eastern Atlantic populations by Guerra (1979). Food consists of bivalves and crustaceans. Larvae and juveniles are preyed upon by albacore (*Thunnus alalunga*), etc., and adults by benthic finfishes.

Size : Maximum total length 1.2 m in females and to 1.3 m in males; maximum weight 10 kg; common to 3 kg. In the western Mediterranean, mantle length at first maturity is about 9.5 cm in males, 13.5 cm in females.

Interest to Fisheries : World catches attributed to O. vulgaris declined from peaks in the late sixties (more than 100 000 metric tons per year) to 20 000 to 30 000 tons in recent years (FAO, 1983). Part of the non-identified world catches of Octopus oscillating between 120 000 and 160 000 metric tons annually, also pertain to this species (including part of the nearly 45 000 metric tons caught by Japan in the Inland Sea, Fishing Area 61, and most of the catches (between 40 000 and 50 000 metric tons) taken by Spanish vessels on the Sahara Banks off West Africa, Fishing Area 34). The species is highly desirable and commands high prices throughout its distributional range and supports artisanal as well as industrial fisheries. It is taken mainly with lures, hook-and-lines, pots, spears and otter trawls. In the Inland Sea of Japan, some 12 000 to 17 000 pots are laid out annually to provide shelter and enhance egg conservation as a measure to safeguard recruitment of the fishable stock. This species is marketed fresh, frozen and dried salted, mostly for human consumption.

Local Names : BAHAMAS: Scuttle; BULGARIA: Octopod; CHILE: Pulpo; CYPRUS: Octopodi; EGYPT: Akhtaboot; FRANCE: Pieuvre, Poulpe de roche; GREECE: Khtapodi; ITALY: Polpo; JAPAN: Ma dako; LEBANON: Akhtaboot; LIBYA: Garnet; MALTA: Qarnita; MONACO: Purpu; MOROCCO: Pulpe; SPAIN: Pulpo; TUNISIA: Qarnit kbir; TURKEY: Ahtapot; USA: Common octopus; USSR: Osminog; YUGOSLAVIA: Hobotnika.

Literature : Mangold-Wirz (1963, biology, western Mediterranean); Basilio & Pérez-Gandaras Pedrosa (1973, fishery, West Africa); Fischer (ed., 1973, Species Identification Sheets, Mediterranean and Black Sea, fishing area 37); Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31); Guerra (1979, growth); Hatanaka (1979b, spawning season; 1979c, fishery, biology, West Africa); FAO (1981, population dynamics, West Africa); Roper & Sweeney (1981, Species Identification Sheets ,eastern central Atlantic, fishing areas 34/47 in part); Fisheries Committee for the Eastern Central Atlantic (1982, production model).

Remarks : While this species, or species-complex, is very widely distributed around the world, its taxonomic and geographic parameters still are not precisely defined.

Octopus zonatus Voss, 1968

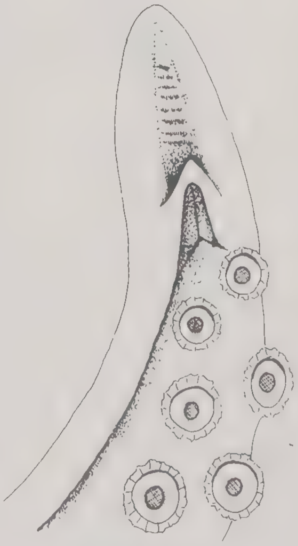
OCT Oct 22

Octopus zonatus Voss, 1968, Bull.Mar.Sci., 18(3):647.

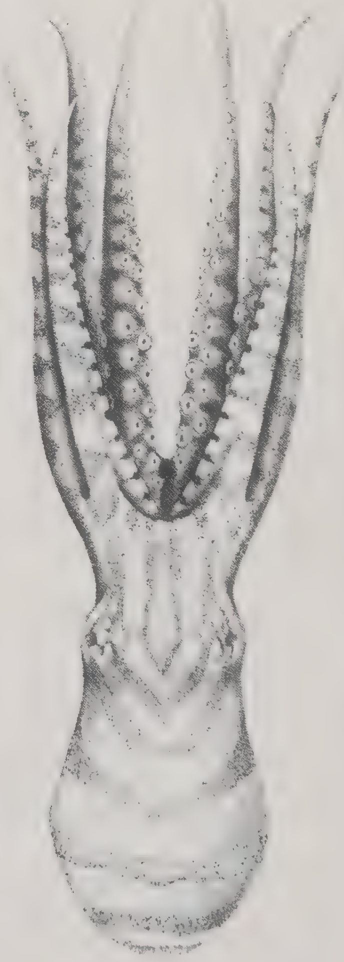
Synonymy : None.

FAO Names :
En - Atlantic banded octopus
Fr - Poulpe zèbre
Sp - Pulpo acebrado

Diagnostic Features : Mantle small, oblong; mantle wall thick, muscular. Head narrow; web shallow. Arms of moderate length; right arm III hectocotylized in males, only slightly shorter than left III; ligula slender, pointed, medium-sized (6.3 to 8.5% of arm length), groove with raised, inrolled edges, a median ridge, and faint transverse rugae; calimus erect, conspicuous; 6 or 7 lamellae on outer demibranch of gill. Colour pattern distinct: yellowish to greyish white bands alternating with dark greyish or brownish bands transversely across the mantle, longitudinally on the head and transversely on the arms.

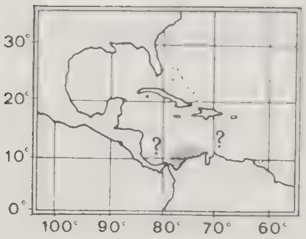


tip of hectocotylized right arm III of male



dorsal view

Geographical Distribution : Western Atlantic Ocean: Colombia.



Habitat and Biology : A benthic species found in 30 to 75 m depth.

Size : Maximum mantle length 3 cm.

Interest to Fisheries : Small species of undetermined fishery potential.

Local Names :

Danoctopus schmidti Joubin, 1933

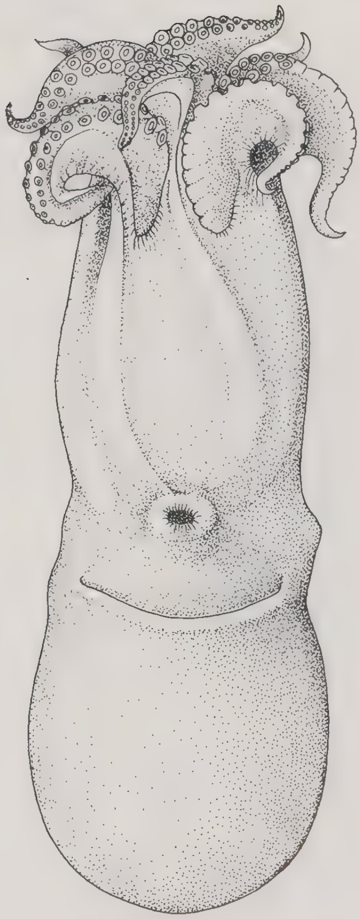
OCT Dan 1

Danoctopus schmidti Joubin, 1933, Ann.Inst.Oceano, 13(1):4.

Synonymy : None.

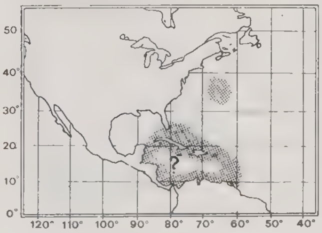
FAO Names : En - Dana octopus
Fr - Poulpe dana
Sp - Pulpito monedero

Diagnostic Features : Mantle compact, globular, nearly as wide as long; skin slightly papillose. Head broad, short; eyes small; no neck constriction; 2 widely spaced ocular cirri. Suckers in 2 rows, arms moderately long and stout; web deep - ½ of arm length; right arm III hectocotylized in males, much shorter than left III, stouter, bordered with broad extension of web; ligula and calimus present (undescribed); 9 lamellae on demibranch of gill.



ventral view

Geographical Distribution : Western north Atlantic: Dry Tortugas, Dominica, Bermuda, 38°N 70°W.



Habitat and Biology : Immature forms are captured in midwater, adults are benthic in depths to 600 m on trawlable bottom.

Size : Maximum mantle length 4 cm.

Interest to Fisheries : A small species of undetermined fishery potential.

Local Names :

Remarks : Possibly juvenile form of another taxon.

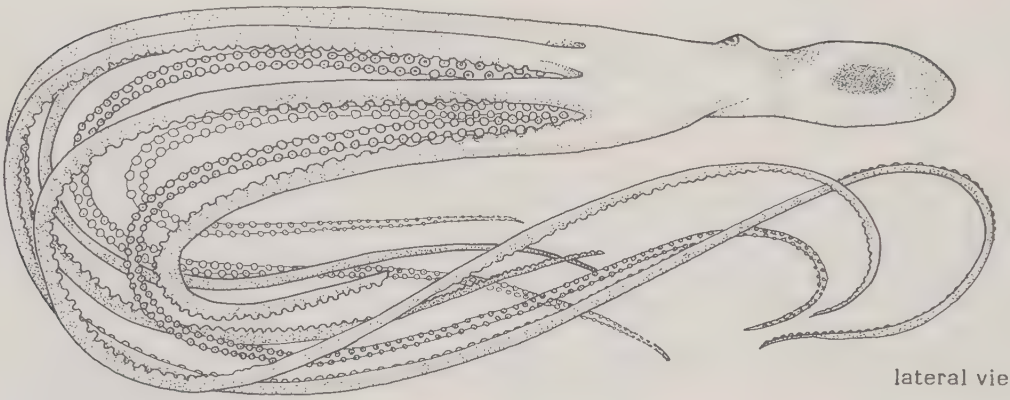
Euaxoctopus pillsburyae Voss, 1975

OCT Euax 1

Euaxoctopus pillsburyae Voss, 1975, Bull.Mar.Sci., 25(3):346.

Synonymy : None.

FAO Names : En - Map octopus
Fr - Poulpe lierre
Sp - Pulpo lampazo



lateral view

Diagnostic Features : A small species. Mantle small, only 10% of total length, oblong; neck constricted; arms very long, slender, attenuate; suckers biserial, very small, none enlarged in males; web very low, less than 6% of arm length; right arm III hectocotylized in males, much shorter and stouter than others; ligula lanceolate with raised margins forming a broad groove with numerous (15 to 20) transverse ridges; calimus relatively large, well-developed, sharply pointed; 7 lamellae on outer demibranch of gill. Colour: a large, darkly pigmented patch, enclosed by a small ridge on each dorsolateral side of the mantle.

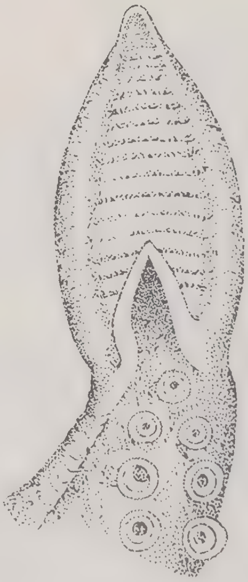
Geographical Distribution : Tropical western Atlantic: Surinam.

Habitat and Biology : A benthic species occurring in depths from 20 to 60 m on trawlable bottoms.

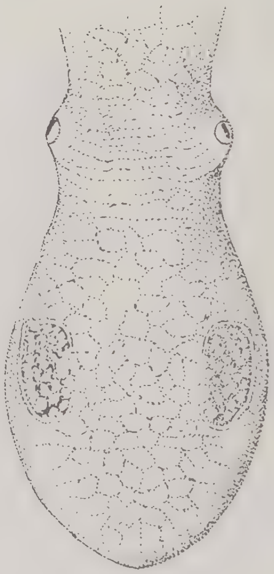
Size : Maximum mantle length 3 cm, total length to 20 cm.

Interest to Fisheries : Currently there is no fishery directed at this species, but it is taken as bycatch in trawls.

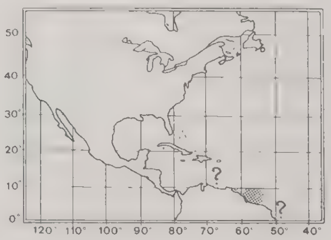
Local Names :



tip of hectocotylized right arm III of male



dorsal view of body and head



Scaeurgus unicirrhus (Orbigny, 1840)

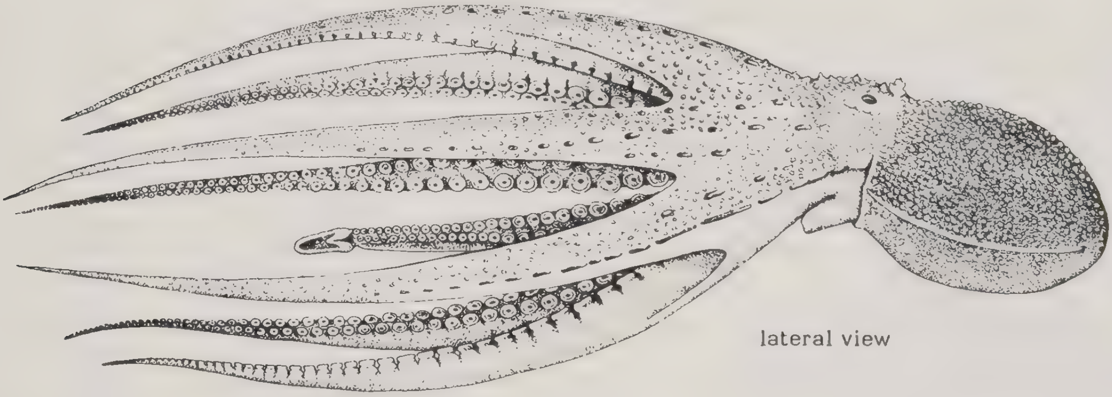
OCT Scae 1

Octopus unicirrhus Orbigny, 1840, in 1834-1848, Hist.Nat.Ceph.Acetab., 70.

Synonymy : Octopus unicirrhus Orbigny, 1840; Octopus cocco Verany, 1846; Scaeurgus patagiatus Berry, 1913.

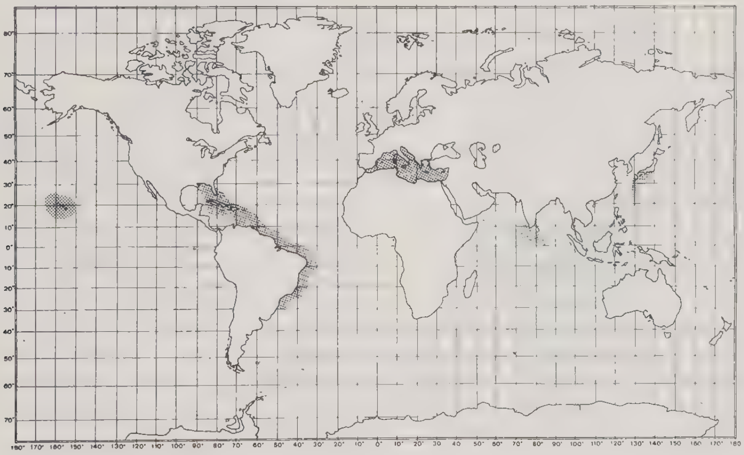
FAO Names :

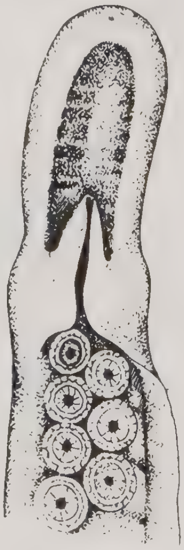
En	Unihorn octopus
Fr	Poulpe licorne
Sp	Pulpo unicornio



lateral view

Diagnostic Features : Mantle compact, oblong; body covered with round papillae or warts that may coalesce and form linear ridges; a peripheral ridge encircles the lateral surfaces of the mantle. A single, multified cirrus over each eye. Arms moderate; web deep; left arm III hectocotylized in males, markedly shorter than right III; ligula long, blunt, spoon-shaped, (8 to 11% of arm length) with swollen, heavily infolded margins, deep groove and transverse striae; calimus long, acutely conical with a deep groove; mostly 12 or 13 lamellae on outer demibranch of gill, range 11 to 14.





tip of hectocotylized right arm III of male

Geographical Distribution : Worldwide, scattered in tropical and warm temperate waters.

Habitat and Biology : A benthic species occurring in the depth range between 100 and 400 m, but occasionally down to 800 m, associated with sandy and coralline bottoms. There seems to be migration to the spawning grounds; spawning takes place in summer (by August and September) in the western Mediterranean, but throughout the year in tropical seas. The species feeds on molluscs, crustaceans, and small fishes.

Size : Maximum mantle length 6 cm. Males are mature at 5 cm.

Interest to Fisheries : Unassessed, but a regional potential is believed to exist, in some regions.

Local Names : USA: Unihorn octopus.

Literature : Mangold-Wirz (1963, biology, western Mediterranean).

Cistopus indicus (Orbigny, 1840)

OCT Cist 1

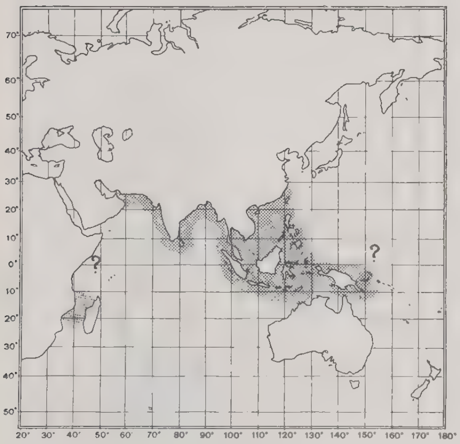
Octopus indicus Orbigny, 1840, in 1834-1848, Hist.Nat.Ceph.Acetab., 24.

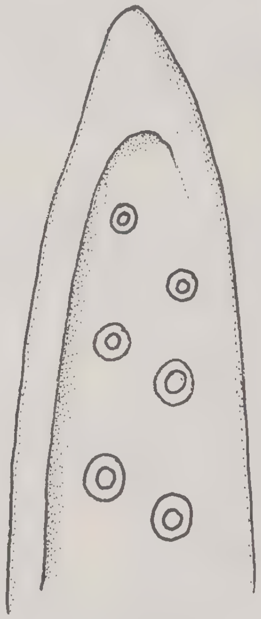
Synonymy : Octopus indicus Orbigny, 1840; Cistopus bursarius (Steenstrup MS) Hoyle, 1886.

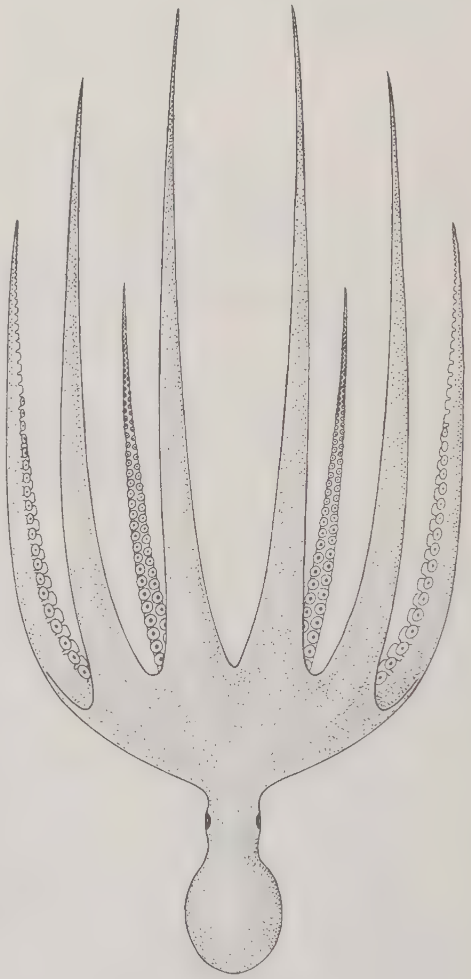
FAO Names :
En - Old woman octopus
Fr - Poulpe vieille femme
Sp - Pulpo perforado

Diagnostic Features : Mantle elongate; neck constricted; head narrow. Arms long, slender, attenuate tips; dorsal arms (I) always longest and stoutest, IV shortest; dorsum covered with fine, low, widely-spaced warts; a small pouch occurs on each segment of the web between the bases of the arms; these 8 water pouches communicate with the sea water through small pores that open on the oral surface of the web; right arm III hectocotylized with a very small ligula (3% of arm length) that appears smooth and poorly developed; 10 or 11 lamellae on demibranch of gill.

Geographical Distribution : Indo-Pacific: mostly Indo-Malayan region, the Philippines, China, Bangladesh, India and Pakistan, and recorded off Mozambique (?).




tip of hectocotylized right arm III of male


dorsal view

Habitat and Biology : A benthic species, occurring from 0 to 50 m depth on mud bottom in Hong Kong.

Size : Maximum total length 60 cm; maximum mantle length 18 cm, weight 2 kg.

Interest to Fisheries : The species is a primary commercial octopod in most Asian markets. It also supports localized and subsistence fisheries in the Philippines. About 50 metric tons landed in Hong Kong per year.

Local Names : CHINA: Laai por (Muddy old woman).

Literature : Voss & Williamson (1971, Hong Kong); Pickford (1974).

Pteroctopus tetracirrhus (Delle Chiaje, 1830)

OCT Pter 1

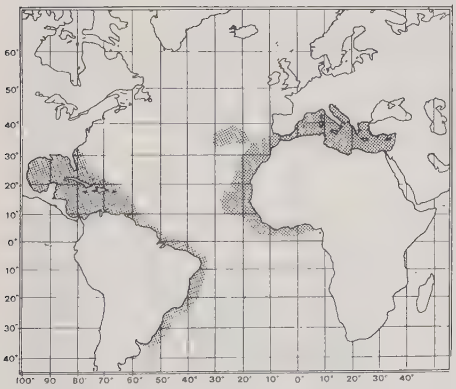
Octopus tetracirrhus Delle Chiaje, 1830, *Mem.Anim.Napoli*, 4, pl. 72.

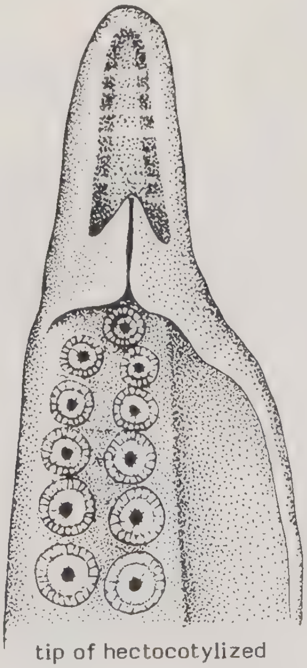
Synonymy : *Octopus tetracirrhus* Delle Chiaje, 1830; ? *Scaeurgus titanotus* Troschel, 1857.

FAO Names :
En - Fourhorn octopus
Fr - Poulpe à quatre cornes
Sp - Pulpo cuatro cuernos

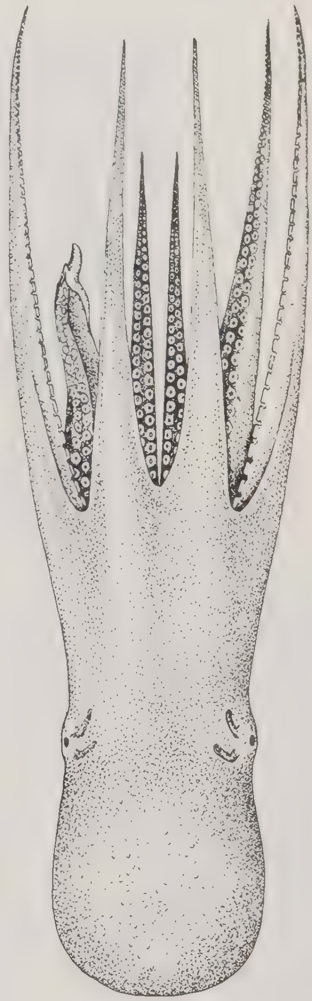
Diagnostic Features : A median-sized, deepwater octopus. Mantle very broadly oval, usually as broad as long; neck not constricted; the skin and subcutaneous tissue are very soft and gelatinous. Head nearly as wide as mantle; two long, slender cirri occur over each eye (may measure up to 50% as long as mantle). Arms of moderate length; suckers biserial proportianally very small and imbedded; web deep-up to 40% of arm length; the surface of the skin is covered with low, closely-set tubercles; left arm III hectocotylized, stouter and shorter (60 to 80%) than right III; ligula broadly conical (blunt tip); large (5 to 11% of arm length), with shallow groove and faint transverse ridges; calimus medium-sized, conical, deeply grooved; 9 or 10 filaments on outer demibranch of gill.

Geographical Distribution : Mediterranean and Atlantic Ocean: east coast of Africa (Azores, Cape Verde Islands); Cuba; Gulf of Mexico, east coast of US from North Carolina, Caribbean Sea to Uruguay.





tip of hectocotylized right arm III of male



dorsal view

Habitat and Biology : A benthic species occurring from 25 to about 720 m depth on muddy bottoms. Medium-sized individuals are taken in April in demersal catches. Males and females mature consecutively by May/June and June/July respectively. Young, immature individuals appear in the catches by November and December. Longevity is probably about 2 or 3 years.

Size : Maximum mantle length 13 cm in females, 11 cm in males; maximum total length 28 cm. Mantle length at first maturity about 11 cm in females, 8.5 cm in males.

Interest to Fisheries : Currently minor; taken as bycatch in shrimp or finfish trawling operations in western Mediterranean and western Atlantic. Separate statistcs are not reported for this species.

Local Names :

Literature : Mangold-Wirz (1963, biology, western Mediterranean).

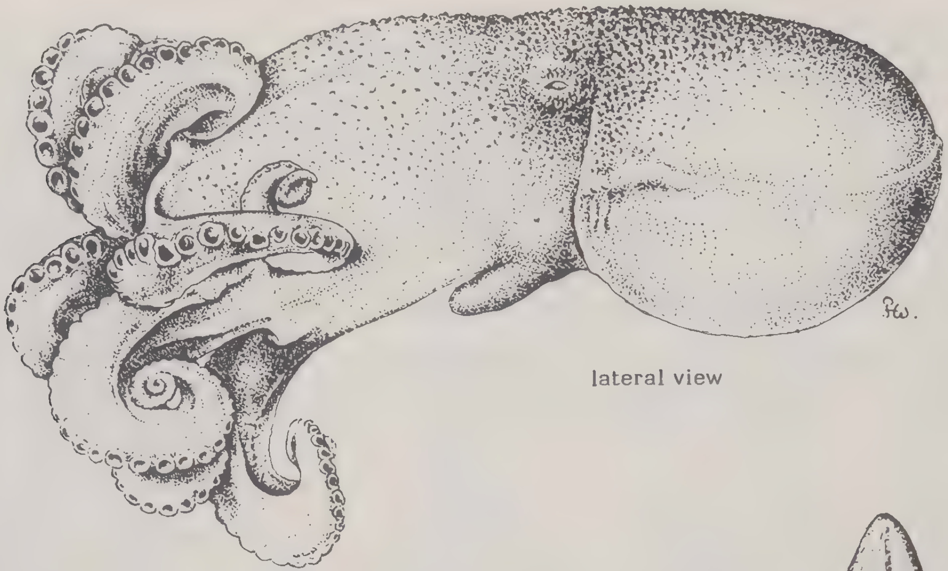
Eledone cirrosa (Lamarck, 1798)

OCT Eled 1

Octopus cirrhosus Lamarck, 1798, Bull.Soc.Philom.Paris, 2:130.

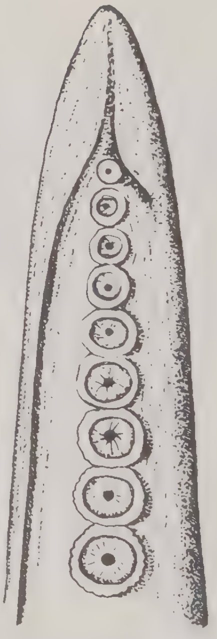
Synonymy : Octopus cirrhosus Lamarck, 1798; Octopus aldrovandi Montfort, 1802 (see Robson, 1932, p. 264).

FAO Names : En - Horned octopus
Fr - Elédone commune
Sp - Pulpo blanco

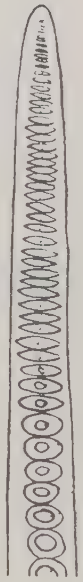


lateral view

Diagnostic Features : Mantle ovoid, broad; skin covered with very fine, closely-set granulations or warts, interspersed with larger warts; a low, pale-coloured ridge encircles the lateral periphery of the mantle. Head narrower than body; one cirrus over each eye. Arms moderately short; suckers uniserial (one row only); web about 30% (21 to 41%) of arm length; right arm III hectocotylized, about 69 to 76% as long as left III; ligula very short (3 or 4% of arm length), indistinct; calimus lacking; suckers near tips of remaining arms of males modified by being compressed and drawn out into cirrus-like prolongations with much reduced sucker size; 11 filaments on outer demibranch of gill. Colour: living animal yellowish or reddish orange to reddish brown dorsally with diffuse rust-brown patches.



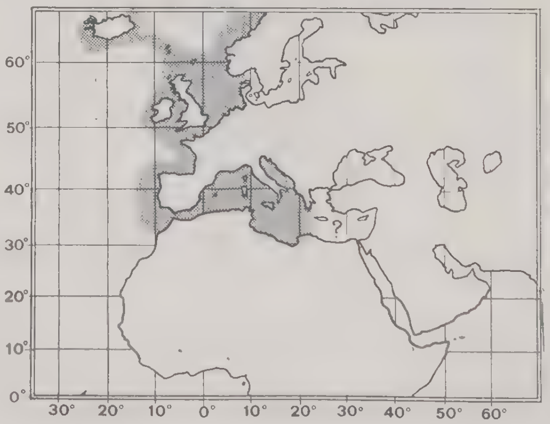
tip of hectocotylized right arm III of male



tip of normal arm

Geographical Distribution : Eastern Atlantic: northeast Atlantic, Iceland (to 67°N) and Mediterranean Sea.

Habitat and Biology : A benthic species occurring on trawlable grounds from the coastline down to about 500 m depth, mostly between 60 and 150 m. Females predominate from 30 to 80 m, males below 100 m depth. This species seems to be rather stationary.



In the western Mediterranean, spawning occurs between May and September with a peak in July. Females deposit from 800 to 1 500 large eggs (up to about 7.5 mm long) which take about 100 days to hatch (at temperatures of 16°C). The juveniles appear in demersal catches by about March, measuring between 2 and 2.5 cm (mantle length). In spring of the following year females have attained about 9 to 9.5 cm mantle length, males about 7 cm. Growth rates vary inversely with size and seasonally, directly with temperature (Mangold-Wirz, 1963). A similar growth pattern was found in the North Sea, off Scotland, but due to overall lower temperatures growth is slower (Boyle & Knobloch, 1982) and apparently larger maximum sizes are reached. In the western Mediterranean, the lifespan appears to be 2 or 3 years, in the North Sea probably longer. Food consists primarily of crustaceans such as shrimps (Crangon), crabs (Carcinus, Macropipus), and lobsters (Nephrops).

Size : Maximum total length 40 cm; maximum weight about 1.2 kg (females grow larger than males). In the western Mediterranean, mantle length at first maturity is about 12.5 cm in females; males start maturing at about 5 cm mantle length.

Interest to Fisheries : The Mediterranean catch for all Eledone species was reported as about 2 300 metric tons in 1981 (FAO, 1983). Most of this corresponds to E. cirrosa, which is the most abundant species of the genus. It is taken throughout the year, with best catches usually in July to December. In the western Mediterranean, extensive fisheries exist for this and other octopus species, which are important for the local economy. The species is primarily caught with bottom trawls, and to a lesser extent with seines.

Local Names : FRANCE: Elédone; GREECE: Moscoctapoda; ITALY: Moscardino bianco; MONACO: Purpissa; SPAIN: Pulpo blanco; TUNISIA: Qarnit; TURKEY: Ahtopot; UK: Curled octopus.

Literature : Mangold-Wirz (1963, biology, western Mediterranean); Fischer (ed., 1973, Species Identification Sheets, Mediterranean and Black Sea, fishing area 37); Moriyasu (1981, biology, population dynamics and fishery, western Mediterranean); Boyle & Knobloch (1982, growth, Scotland).

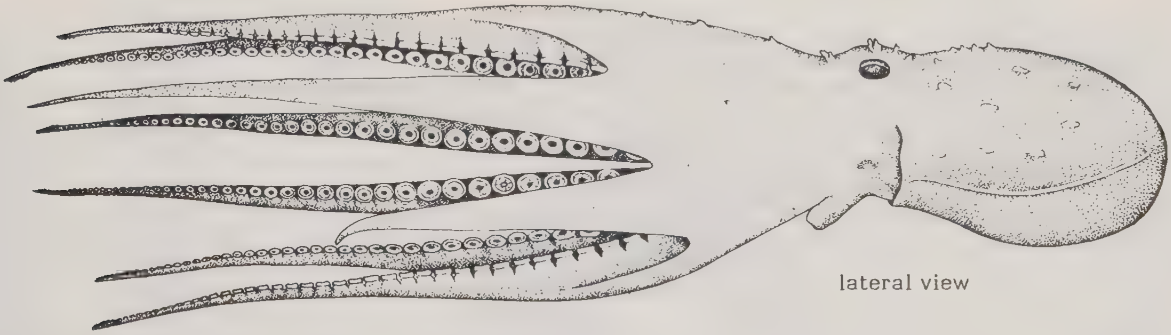
Eledone massyae Voss, 1964

OCT Eled 3

Eledone massyae Voss, 1964, Bull.Mar.Sci.Gulf and Carib., 14(3):511.

Synonymy : Moschites brevis Massy, 1916.

FAO Names :
En - Combed octopus
Fr - Elédone peigne
Sp - Pulpo desflecado



lateral view

Diagnostic Features : Animal covered with fine, round papillae interspersed with a few larger, simple papillae or warts. Mantle oval, broad (the width 60 to 100% of mantle length), somewhat dorso-ventrally flattened; lateral periphery surrounded by a low cutaneous fold or ridge; mantle aperture wide. Head broad; no neck constriction; 2 to 4 bifid or multifid cirri occur over each eye; Arms moderately long, slender, tapering; suckers uniserial (in one row), small, well-spaced proximally, crowded and minute distally; in males the 7 non-hectocotylized arms have suckers modified into a double row of minute, fleshy papillae; right arm III hectocotylized, only 65% as long as left III; ligula 4 to 15% of arm length, conical, undifferentiated, calimus absent; 8 to 10 filaments on outer demibranch of gill.

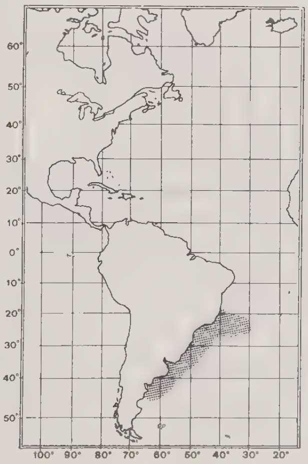
Geographical Distribution : Southwestern south Atlantic Ocean; Brazil and Argentina (20'S to 43'S); Trinidade Island (20°30'S, 29°20'W).

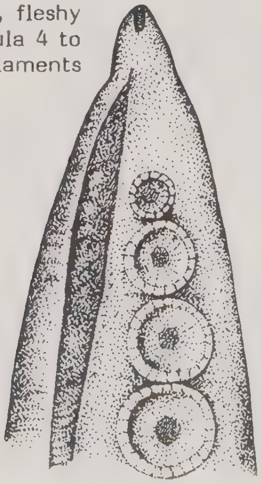
Habitat and Biology : A very little known, benthic species; caught on trawlable bottoms at 30 to 160 m depth.

Size : Maximum mantle length 7.5 cm.

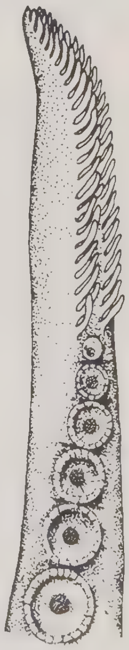
Interest to Fisheries : Possibly as bycatch to other demersal fisheries.

Local Names :





tip of hectocotylized right arm III of male



tip of normal arm

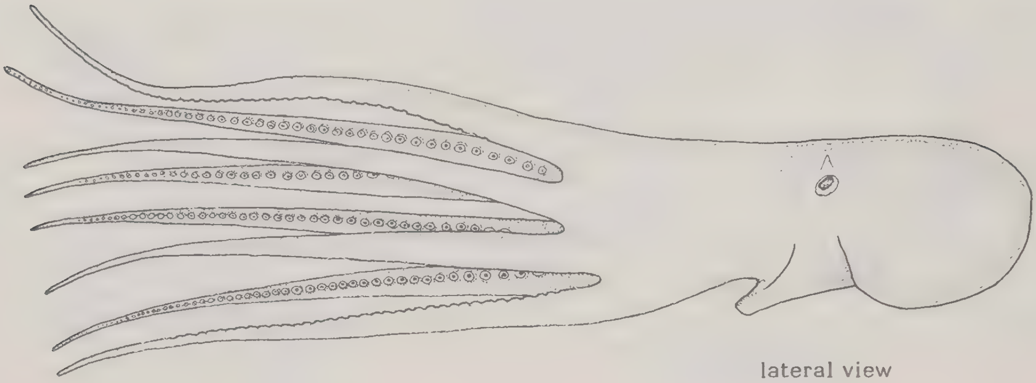
Eledone moschata (Lamarck, 1798)

OCT Eled 2

Octopus moschatus Lamarck, 1798, Bull.Soc.Philom.Paris, 2:130.

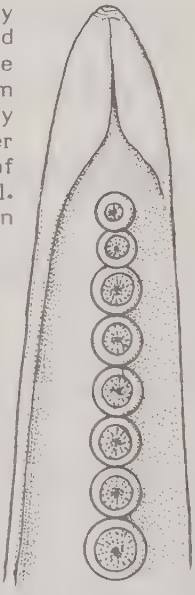
Synonymy : Octopus moschatus Lamarck, 1798.

FAO Names :
En - Musky octopus
Fr - Elédone musquée
Sp - Pulpo almizclado

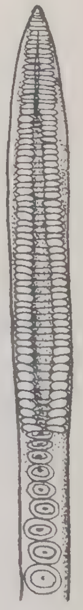


lateral view

Diagnostic Features : Mantle ovoid, moderately broad; skin smooth to very finely granulose; no ridge occurs around the lateral periphery of the mantle. Head narrower than mantle. Arms subequal, moderately long - up to 22% of mantle length; suckers uniserial, enlarged in males; web moderately deep - 30% of arm length; right arm III hectocotylized, length only 60 to 70% of left III; ligula very short - 3% of arm length; undifferentiated; calimus absent; distal tips of all other arms of males modified by subdivision of uniserial suckers into 2 parallel rows of flattened laminae or platelets; 11 or 12 filaments on outer demibranch of gill. Living animal exudes a very prominent, musk-like odour, reportedly from glands in the skin. Live colour greyish-brown with blackish-brown blotches on dorsum.

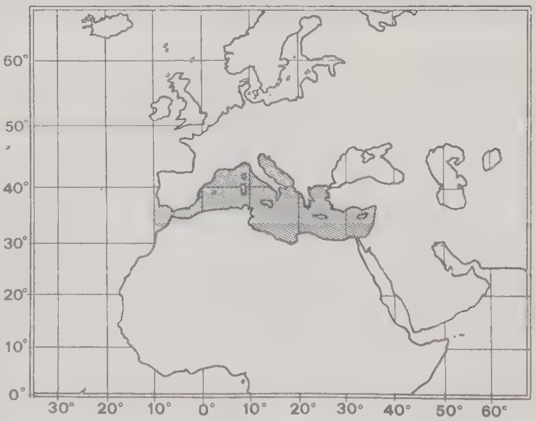


tip of hectocotylized right arm III of male



tip of normal arm

Geographical Distribution : Mediterranean Sea including Adriatic Sea; Gulf of Cadiz (Atlantic).



Habitat and Biology : A coastal benthic species occurring from 10 to 200 and 300 m depth on muddy bottoms; in the western Mediterranean, mating concentrations occur in February from 60 to 90 m depth, with most males mature and females nearly so; spawning occurs between March and July.

Size : Maximum total length 35 cm; mantle length 14 cm.

Interest to Fisheries : The 1981 catch for all Eledone species was about 2 300 metric tons (FAO, 1983), part of which was E. moschata. This species is taken as bycatch in local trawl fisheries. In the western Mediterranean, it is captured year-round, with a maximum from April to July.

Local Names : FRANCE: Elédone musquée; GREECE: Moscoctapoda; ITALY: Moscardino rosso; MALTA: Karnita tal misk; MONACO: Muscardin; SPAIN: Pulpo almizclado; TUNISIA: Bou msik; TURKEY: Ahtopot; YUGOSLAVIA: Muzgavac.

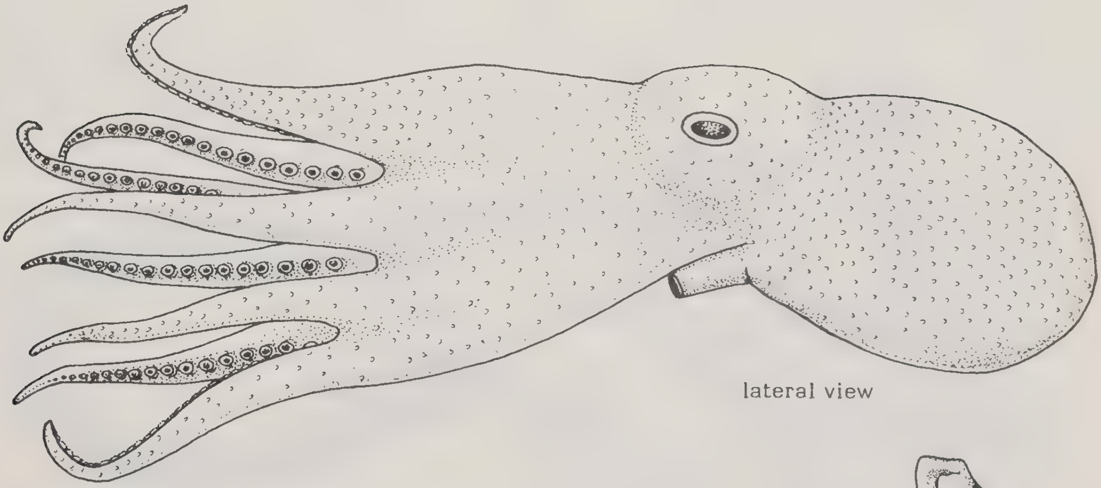
Literature : Fischer (ed., 1973, Species Identification Sheets, Mediterranean and Black Sea, fishing area 37).

Pareledone species

OCT Parel

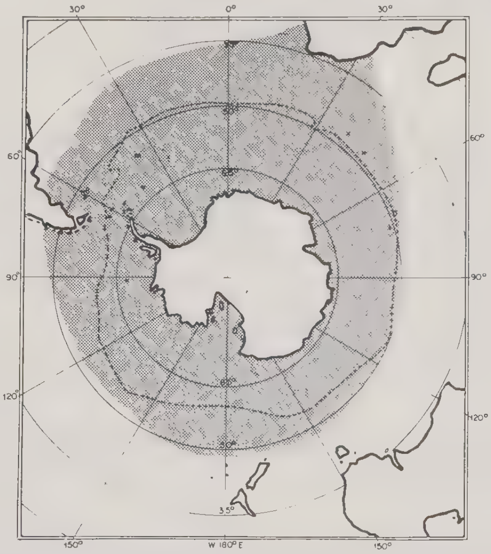
Synonymy : None.

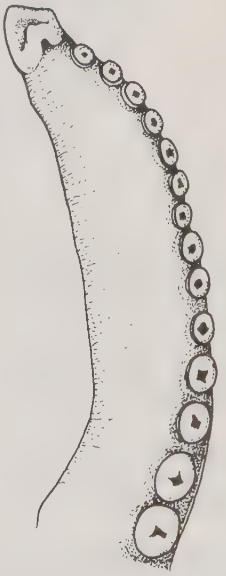
FAO Names : En - Antarctic octopuses
Fr - Elédones antarctiques
Sp - Pulpos antárticos



lateral view

Diagnostic Features : Mantle broad, saccular, granulose. Arm suckers uniserial; right arm III hectocotylized in males with small ligula and calimus.





tip of hectocotylized right arm III of male

Geographical Distribution : Southern Ocean: southern South America, South Africa to Antarctica.

Habitat and Biology : A benthic species with a total depth range from 10 to 750 m, but occurring primarily on the Antarctic shelf, usually on rough grounds.

Interest to Fisheries : These small to large octopuses with potential value to fisheries occur in sizeable quantities on the Antarctic shelf and northward to the Falkland/Malvina Islands and the Burwood Bank off southern Patagonia. So far, they are only taken as bycatch in bottom trawls and their annual catch probably does not exceed a few hundred tons. The consistency of the flesh is firm, similar to octopuses that are regularly utilized. Their often "loose" and semigelatinous skin, however, may detract from their good eating qualities.

Local Names :

Literature : Everson (1977, resources, Southern Ocean).

Remarks : This group includes several poorly described species in need of revision, being undertaken by G.L. Voss. Southern substitute of Octopus species.

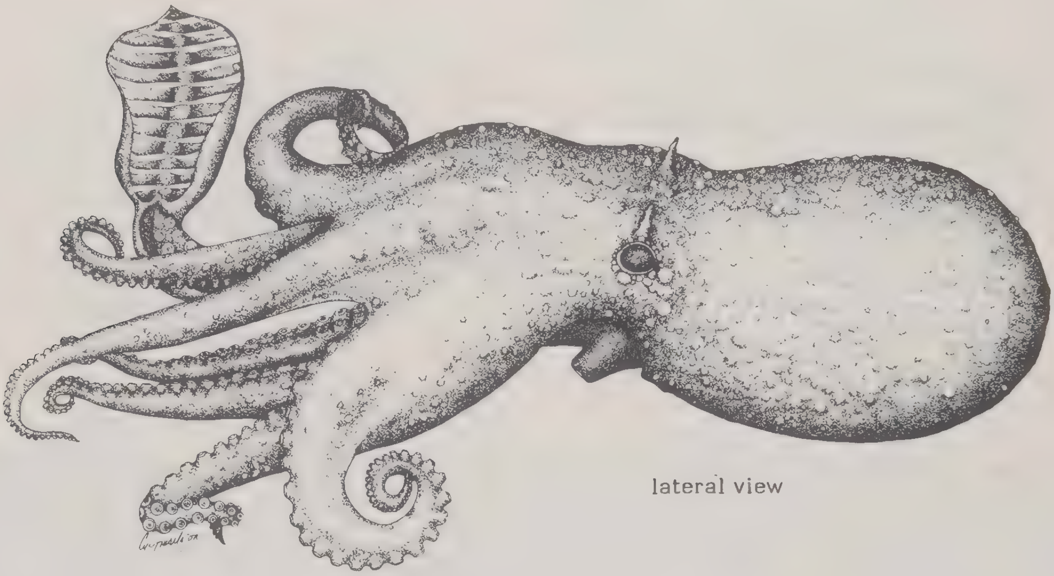
Bathypolypus arcticus (Prosch, 1849)

OCT Bath 1

Octopus arcticus Prosch, 1849, Kong.Dan.Viden.Sels., 1:59.

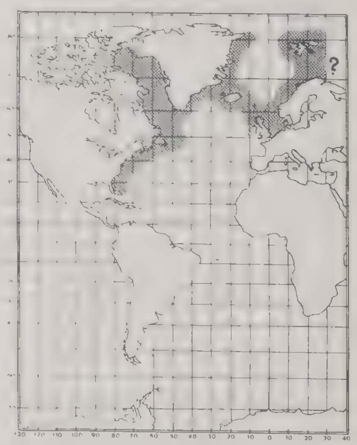
Synonymy : Octopus arcticus Prosch, 1849; Octopus groenlandicus Steenstrup, 1856; Octopus bairdi Verrill, 1873; Octopus lentus Verrill, 1880; Octopus obesus Verrill, 1880; Octopus faeroensis Russell, 1922.

FAO Names : En - North Atlantic octopus
Fr - Poulpe boreal
Sp - Pulpito violáceo



lateral view

Diagnostic Features : Mantle globular, nearly as wide as long; mantle opening very narrow, restricted; surface of mantle, head, arms and web covered with simple or multifid warts, especially around the eyes. Head narrower than mantle; a large, prominent multifid, cirrus occurs above each eye; some specimens grade to smooth skinned. Arms short, irregular order; suckers small, biserial; web varies between 1/4 to 1/2 as deep as the longest arm; right arm III hectocotylized, about 75% as long as arm I; ligula huge, broad, spade-shaped, usually with a distal sharp-pointed tip; sides inrolled, forming a deep trough (groove) in which lie 9 to 13 strong, transverse laminae; calimus very small, conical. Ink sac absent; 7 or 8 filaments on demibranch of gill.



Geographical Distribution : North Atlantic Ocean: Straits of Florida northward to Greenland, Iceland, Spitzbergen and southward to northern Great Britain and North Sea.

Habitat and Biology : A benthic species with a broad depth distribution ranging from a few meters (14 m) to about 1 000 m depth on mud bottom mostly of the continental shelf and upper slope.

Breeding of the 13 mm long and about 6 mm wide eggs takes place throughout the year. The lifespan is 18 months. Its feeding pattern is opportunistic, including ophiuroids (brittle stars), crustaceans (isopods, amphipods, copepods, ostracods, barnacles), polychaete worms, bivalve and gastropod molluscs. It is in turn preyed upon by bottom fishes.

Size : Maximum mantle length 10 cm, mostly to 6 cm; weight from 300 to 400 g.

Interest to Fisheries : This species is frequently taken as bycatch in otter trawls; its potential for a directed fishery has not been assessed, but is believed to be significant, if the animal proves of commercial interest.

Local Names : USA: North Atlantic octopus.

Remarks : The species is very variable in appearance; other species of this genus occur in the eastern Atlantic (B. proschi) and Mediterranean (B. sponsalis).

Benthoctopus januari (Hoyle, 1885)

OCT Benth 1

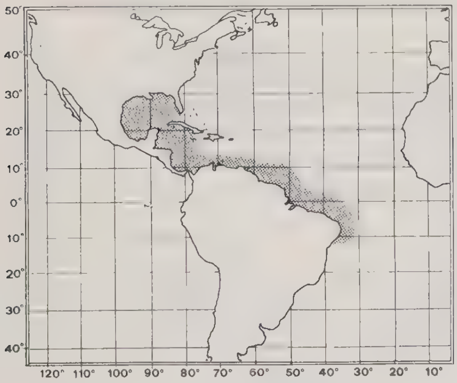
Octopus januari Hoyle, 1885, Ann.Mag.Nat.Hist., (5)15:229.

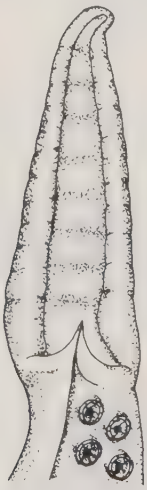
Synonymy : Octopus januari Hoyle, 1885.

FAO Names :
En - January octopus
Fr - Poulpe filamenteux
Sp - Pulpo filamentoso

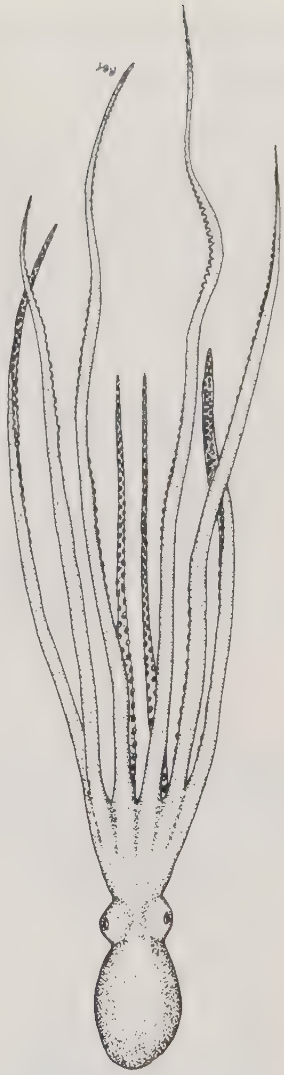
Diagnostic Features : Mantle saccular, elongate, smooth, devoid of sculpture. Head narrow; neck constriction deep. Arms long, narrow, very attenuate; suckers biserial; web very shallow, a maximum of 15% of longest arm length; right arm III hectocotylized, only about half as long as left III; ligula medium-sized (6 to 9% of arm length) with a deep groove and weak transverse laminae; calimus small, acute. Ink sac absent; 7 or 8 lamellae on outer demibranch of gill.

Geographical Distribution : Gulf of Mexico, Caribbean Sea, Tropical Atlantic to 10°S.





tip of hectocotylized right arm III of male



dorsal view

Habitat and Biology : A deep-living, benthic species occurring between 400 and 750 m depth on mud bottom.

Size : Maximum mantle length 7 cm.

Interest to Fisheries : None currently; its firm consistency makes it a good candidate for the development of a fishery.

Local Names :

Remarks : A second species, B. oregonae Toll, 1981, also occurs in the Caribbean; it is a more gelatinous, stouter, shorter-armed species than B. januari.

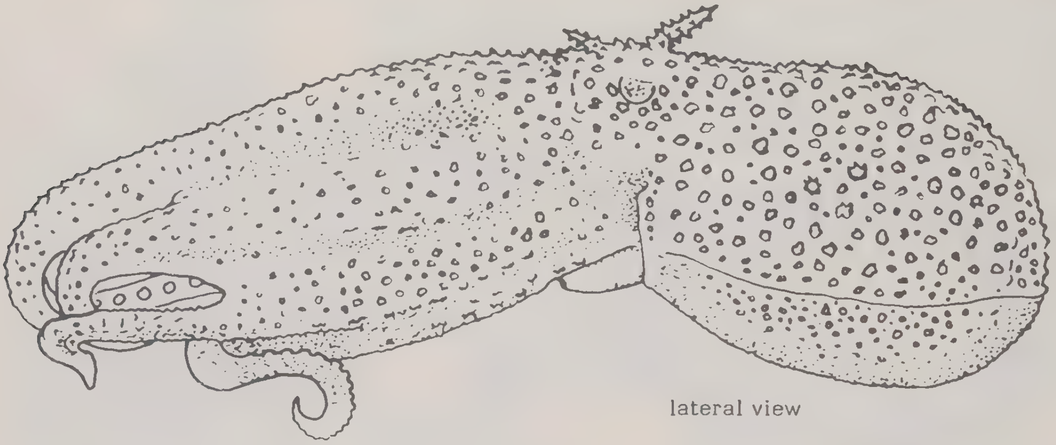
Tetracheledone spinicirrhus Voss, 1955

OCT Tetra 1

Tracheledone spinicirrhus Voss, 1955, Bull.Mar.Sci.Gulf and Carib., 5(2) p. 107.

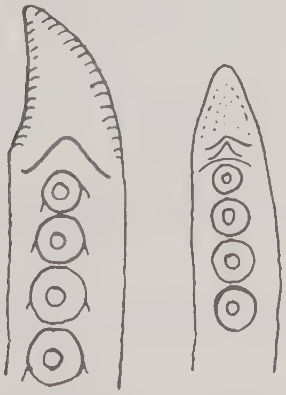
Synonymy : None.

FAO Names : En - Spiney-horn octopus
Fr - Poulpe cornu
Sp - Pulpo cornudo



lateral view

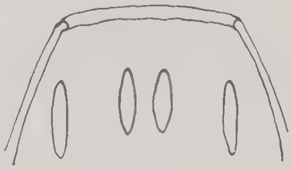
Diagnostic Features : Mantle globular, as wide as long; surface of mantle, head, arms, and web covered with conspicuous, closely-set, large, stellate tubercles; a narrow, tuberculate, fold of skin encircles the lateral surface of the mantle; funnel organ, 4 separate longitudinal pads. Head narrower than mantle; two large, papillose cirri above each eye. Arms relatively long with a deep web and uniserial, small, deep-set suckers; right arm III hectocotylized, ligula up to 10% of hectocotylized arm length; calimus short, broad, conical; 6 to 9 lamellae on demibranch of gill.



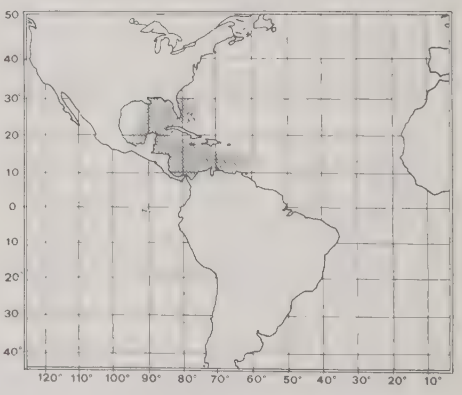
specimen from Gulf of Mexico

holotype

tip of hectocotylized right arm III of male



funnel organ



Geographical Distribution : Gulf of Mexico, Straits of Florida, Caribbean Sea, limits unknown.

Habitat and Biology : A benthic species occurring from about 200 to 400 m depth on trawlable bottom (mud).

Size : Maximum mantle length 10 cm.

Interest to Fisheries : None presently.

Local Names :

5.2 FAMILY ARGONAUTIDAE Tryon, 1879

ARGO

Argonautidae Tryon, 1879, Man.Conch., 1:138.

FAO Names : En - Argonauts, Paper nautiluses
Fr - Argonautes papier
Sp - Argonautas

General Remarks on the Family : The argonauts or paper nautiluses (a misnamer, use of which must be discouraged) are very abundant in tropical to warm-temeprate waters of the world. A large number of nominal species exists, but the group needs revision to verify the species, perhaps 6 to 8 in all. The family is monotypic. The "shell", actually in incubation chamber for the eggs, is popular among collectors because of its beauty, coloration, sculpture and fragility. The largest species, Argonauta argo, attains a maximum size of nearly 30 cm shell diameter; it enters fish markets in India and Japan when fortuitous oceanographic conditions cause mass aggregations so that large numbers can be captured. Normally it is a non-schooling, solitary group.

Diagnostic Features : Sexual dimorphism very marked, with adult females relatively large, up to 10 to 15 times larger than adult males; hectocotylus of males autotomous (self-amputating) into the egg mass that is attached inside a large, external, calcium carbonate egg case ("paper nautilus shell") in which the female also resides, holding on to the case with extremely broad webs on the dorsal arms (I); suckers biserial; web weakly developed; no water pores; no shell vestige.

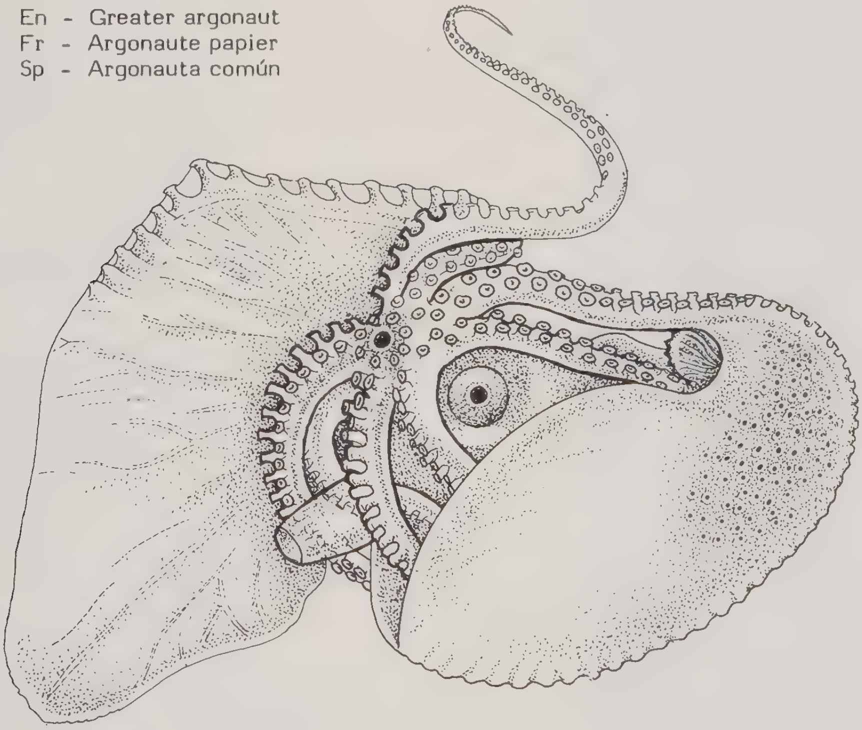
Argonauta argo Linnaeus, 1758

ARGO Argo 1

Argonauta argo Linnaeus, 1758, Systema naturae (ed. 10, 1894):708 (part).

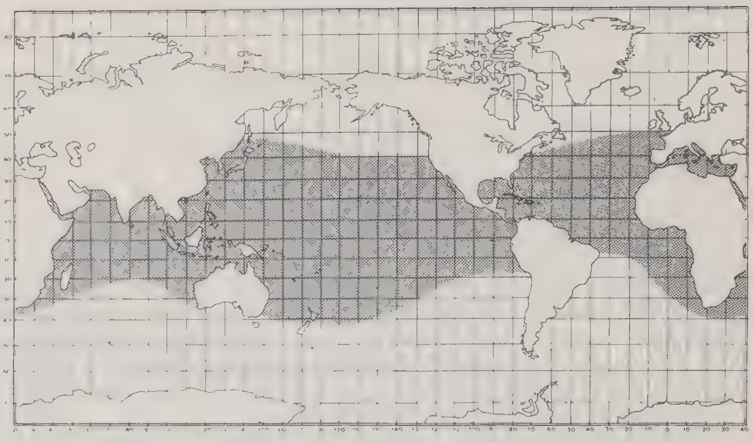
Synonymy : None.

FAO Names : En - Greater argonaut
Fr - Argonaute papier
Sp - Argonauta común



Diagnostic Features : Sexes grossly dimorphic (males minute). Description for females: Mantle narrowly to broadly oval, bluntly pointed posteriorly; mantle opening very broad. Head small, short; eyes prominent. Arms long, subequal; arms I thick at base with a very large membraneous flap that extends nearly their entire length; the web secretes, envelops, and holds the thin white calcareous "shell" in which the female resides, lays eggs, and incubates them.

Geographical Distribution : World-wide in tropical and warm temperate seas.



Habitat and Biology : An epipelagic, oceanic species, occurring in near-surface waters; males possess a large, conspicuous hectocotylus that autotomes and remains in the shell (egg case) of the female to fertilize the eggs; no spermatophores. Occasional mass occurrences are reported nearshore as a result of changed currents. The species is heavily preyed upon by epipelagic predators such as tunas, dolphinfishes, billfishes, etc.

Size : Maximum length of shell to 30 cm in females; mantle to 12 cm; males are of dwarf size, only 1.5 to 2 cm in total length.

Interest to Fisheries : Occasionally found in markets in India and Japan; probably there are no directed fisheries, but fortuitous catches up to several hundred kilograms are landed.

Local Names :

6. CLASSIFICATION OF THE GENERA OF RECENT CEPHALOPODS

(Adapted from Voss, 1977)

- CLASS CEPHALOPODA Cuvier, 1798
  - Subclass NAUTILOIDEA Agassiz, 1847
    - **Family Nautilidae** Blainville, 1825
      - Nautilus Linnaeus, 1758
  - Subclass COLEOIDEA Bather, 1888
    - Order SEPIOIDEA Naef, 1916
      - **Family Spirulidae** Owen, 1836
        - Spirula Lamarck, 1801
      - **Family Sepiidae** Keferstein, 1866
        - Sepia Linnaeus, 1758
        - Sepiella Gray, 1849
      - **Family Sepiadariidae** Naef, 1912
        - Sepiadarium Steenstrup, 1881
        - Sepioloidea Orbigny, 1840
      - **Family Sepiolidae** Leach, 1817
        - Subfamily Rossiinae Appellöf, 1898
          - Rossia Owen, 1834
          - Semirossia Steenstrup, 1887
          - Neorossia Boletzky, 1971
        - Subfamily Heteroteuthinae
          - Heteroteuthis Gray, 1849
          - Nectoteuthis Verrill, 1883
          - Iridoteuthis Naef, 1912
          - Stoloteuthis Verrill, 1881
          - Sepiolina Naef, 1912
        - Subfamily Sepiolinae Appellöf, 1898
          - Sepiola Leach, 1817
          - Euprymna Steenstrup, 1887
          - Rondeletiola Naef, 1921
          - Sepietta Naef, 1912
          - Inioteuthis Verrill, 1881
      - **Family Idiosepiidae** Appellöf, 1898
        - Idiosepius Steenstrup, 1881
    - Order TEUTHOIDEA Naef, 1916
      - Suborder MYOPSIDA Orbigny, 1845
        - **Family Pickfordiateuthidae** Voss, 1953
          - Pickfordiateuthis Voss, 1953
        - **Family Loliginidae** Steenstrup, 1861
          - Loligo Schneider, 1784
          - Doryteuthis Naef, 1912
          - Lolliguncula Steenstrup, 1881
          - Sepioteuthis Blainville, 1824
          - Alloteuthis Wülker, 1920
          - Uroteuthis Rehder, 1945
          - Loliolus Steenstrup, 1856
          - Loliolopsis Berry, 1929
      - Suborder OEGOPSIDA Orbigny, 1845
        - **Family Lycoteuthidae** Pfeffer, 1908
          - Subfamily Lycoteuthinae Pfeffer, 1908
            - Lycoteuthis Pfeffer, 1908
            - Selenoteuthis Voss, 1958
            - Nematolampas Berry, 1913
          - Subfamily Lampadioteuthinae Berry, 1916
            - Lampadioteuthis Berry, 1916
        - **Family Enoploteuthidae** Pfeffer, 1900
          - Subfamily Enoploteuthinae Pfeffer, 1912
            - Enoploteuthis Orbigny, 1839
            - Abralia Gray, 1849
            - Abraliopsis Joubin, 1896
            - Watasenia Ishikawa, 1913
          - Subfamily Ancistrocheirinae Pfeffer, 1912
            - Ancistrocheirus Gray, 1849
            - Thelidioteuthis Pfeffer, 1900
          - Subfamily Pyroteuthinae Pfeffer, 1912
            - Pyroteuthis Hoyle, 1904
            - Pterygioteuthis Fischer, 1896
        - **Family Octopoteuthidae** Berry, 1912
          - Octopoteuthis Rüppell, 1844
          - Taningia Joubin, 1931
        - **Family Onychoteuthidae** Gray, 1849
          - Onychoteuthis Lichtenstein, 1818
          - Onykia LeSueur, 1821
          - Chaunoteuthis Appellöf, 1890
          - Ancistroteuthis Gray, 1849
          - Moroteuthis Verrill, 1881
          - Kondakovia Filippova, 1972
        - **Family Cycloteuthidae** Naef, 1923
          - Cycloteuthis Joubin, 1919
          - Discoteuthis Young & Roper, 1969
        - **Family Gonatidae** Hoyle, 1886
          - Gonatus Gray, 1849
          - Gonatopsis Sasaki, 1920
          - Berryteuthis Naef, 1921
        - **Family Psychroteuthidae** Thiele, 1921
          - Psychroteuthis Thiele, 1921
        - **Family Lepidoteuthidae** Naef, 1912
          - Lepidoteuthis Joubin, 1895
          - Pholidoteuthis Adam, 1950
          - Tetronychoteuthis Pfeffer, 1900
        - **Family Architeuthidae** Pfeffer, 1900
          - Architeuthis Steenstrup, 1857
        - **Family Histioteuthidae** Verrill, 1881
          - Histioteuthis Orbigny, 1841
        - **Family Neoteuthidae** Naef, 1921
          - Alluroteuthis Odhner, 1923
          - Neoteuthis Naef, 1921
        - **Family Bathyteuthidae** Pfeffer, 1900
          - Bathyteuthis Hoyle, 1885
        - **Family Ctenopterygidae** Grimpe, 1922
          - Ctenopteryx Appellöf, 1899
        - **Family Brachioteuthidae** Pfeffer, 1908
          - Brachioteuthis Verrill, 1881
        - **Family Batoteuthidae** Young & Roper, 1968
          - Batoteuthis Young & Roper, 1968
        - **Family Ommastrephidae** Steenstrup, 1857
          - Subfamily Illicinae
            - Illex Steenstrup, 1880
            - Todaropsis Girard, 1890
          - Subfamily Todarodinae
            - Todarodes Steenstrup, 1880
            - Nototodarus Pfeffer, 1912
            - Martialia Rochebrune & Mabille, 1889
          - Subfamily Ommastrephinae
            - Ommastrephes Orbigny, 1835
            - Dosidicus Steenstrup, 1857
            - Symplectoteuthis Pfeffer, 1900
            - Ornithoteuthis Okada, 1927
            - Hyaloteuthis Gray, 1849
        - **Family Thysanoteuthidae** Keferstein, 1866
          - Thysanoteuthis Troschel, 1857
          - Cirrobrachium Hoyle, 1904
        - **Family Chiroteuthidae** Gray, 1849
          - Chiroteuthis Orbigny, 1839
          - Valbyteuthis Joubin, 1931
        - **Family Mastigoteuthidae** Verrill, 1881
          - Mastigoteuthis Verrill, 1881

- **Family Promachoteuthidae** Naef, 1912
  - *Promachoteuthis* Hoyle, 1885
- **Family Grimalditeuthidae** Pfeffer, 1900
  - *Grimalditeuthis* Joubin, 1898
- **Family Joubiniteuthidae** Naef, 1922
  - *Joubiniteuthis* Berry, 1920
- **Family Cranchiidae** Prosch, 1849
  - Subfamily Cranchiinae Prosch, 1849
    - *Cranchia* Leach, 1817
    - *Leachia* LeSueur, 1821
    - *Liocranchia* Pfeffer, 1884
  - Subfamily Taoniinae Pfeffer, 1912
    - *Taonius* Steenstrup, 1861
    - *Egea* Joubin, 1933
    - *Sandalops* Chun, 1906
    - *Liguriella* Issel, 1908
    - *Teuthowenia* Chun, 1910
    - *Megalocranchia* Pfeffer, 1884
    - *Helicocranchia* Massy, 1907
    - *Galiteuthis* Joubin, 1898
    - *Bathothauma* Chun, 1906
    - *Mesonychoteuthis* Robson, 1925
- Order VAMPYROMORPHA Pickford, 1939
  - **Family Vampyroteuthidae** Thiele, 1915
    - *Vampyroteuthis* Chun, 1903
- Order OCTOPODA Leach, 1818
  - Suborder CIRRATA Grimpe, 1916
    - **Family Cirroteuthidae** Keferstein, 1866
      - *Cirroteuthis* Eschricht, 1838
      - *Cirrothauma* Chun, 1911
    - **Family Stauroteuthidae** Grimpe, 1916
      - *Stauroteuthis* Verrill, 1879
      - *Grimpoteuthis* Robson, 1932
      - *Chunioteuthis* Grimpe, 1916
      - *Froekenia* Hoyle, 1904
    - **Family Opisthoteuthidae** Verrill, 1896
      - *Opisthoteuthis* Verrill, 1883
  - Suborder INCIRRATA Grimpe, 1916
    - **Family Bolitaenidae** Chun, 1911
      - *Bolitaena* Steenstrup, 1859
      - *Japetella* Hoyle, 1885
      - *Eledonella* Verrill, 1884
      - *Dorsopsis* Thore, 1949
    - **Family Amphitretidae** Hoyle, 1886
      - *Amphitretus* Hoyle, 1885
    - **Family Idioctopodidae** Taki, 1962
      - *Idioctopus* Taki, 1962
    - **Family Vitreledonellidae** Robson
      - *Vitreledonella* Joubin, 1918
    - **Family Octopodidae** Orbigny, 1845
      - Subfamily Octopodinae Grimpe, 1921
        - *Octopus* Lamarck, 1798
        - *Enteroctopus* Rochebrune & Mabille, 1889
        - *Danoctopus* Joubin, 1933
        - *Cistopus* Gray, 1849
        - *Robsonella* Adam, 1938
        - *Scaeurgus* Troschel, 1857
        - *Pteroctopus* Fisher, 1882
        - *Hapalochlaena* Robson, 1929
        - *Berrya* Adam, 1939
        - *Euaxoctopus* Voss, 1971
      - Subfamily Eledoninae Gray, 1849
        - *Eledone* Leach, 1817
        - *Pareledone* Robson, 1932
        - *Thaumeledone* Robson, 1930
        - *Bentheledone* Robson, 1932
      - Subfamily Bathypolypodinae Robson
        - *Bathypolypus* Grimpe, 1921
        - *Graneledone* Joubin, 1918
        - *Benthoctopus* Grimpe, 1921
        - *Teretoctopus* Robson, 1929
        - *Grimpella* Robson, 1928
        - *Haptochlaena* Grimpe, 1922
        - *Tetracheledone* Voss, 1955
    - **Family Tremoctopodidae** Brock, 1882
      - *Tremoctopus* Delle Chiaje, 1829
    - **Family Ocythoidae** Gray, 1849
      - *Ocythoe* Rafinesque, 1814
    - **Family Argonautidae** Naef, 1912
      - *Argonauta* Linnaeus, 1758
    - **Family Alloposidae** Verrill, 1882
      - *Alloposus* Verrill, 1880

7. LIST OF SPECIES BY MAJOR FISHING AREAS

SPECIES	PAGE	GEOGRAPHICAL DISTRIBUTION																		
		MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES																		
		18	21	27	31	34	37	41	47	48	51	57	58	61	67	71	77	81	87	88
Nautilus macromphalus	26															●				
Nautilus pompilius	26											●				●				
Sepia aculeata	30										●	●		●		●				
Sepia andreana	31													●		●				
Sepia apama	32											●				●		●		
Sepia arabica	33										●									
Sepia australis	34								●		●									
Sepia bertheloti	35					●			●											
Sepia braggi	36										●									
Sepia brevimana	37										●	●				●				
Sepia elegans	37			●	●	●														
Sepia elobyana	39					●														

SPECIES	PAGE	GEOGRAPHICAL DISTRIBUTION																		
		MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES																		
		18	21	27	31	34	37	41	47	48	51	57	58	61	67	71	77	81	87	88
Sepia esculenta	40													●		●				
Sepia kobiensis	41													●		●				
Sepia latimanus	42										●	●		●		●		●		
Sepia longipes	43													●						
Sepia lorigera	43													●						
Sepia lycidas	44													●		●				
Sepia madokai	45													●						
Sepia mestus	46											●				●		●		
Sepia murrayi	46										●									
Sepia officinalis	47			●		●	●		●		●									
Sepia omani	49										●									
Sepia orbignyana	50			●		●	●		●											
Sepia pharaonis	51										●	●		●		●				
Sepia prashadi	52										●	●								

SPECIES	PAGE	GEOGRAPHICAL DISTRIBUTION																		
		MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES																		
		18	21	27	31	34	37	41	47	48	51	57	58	61	67	71	77	81	87	88
Sepia recurvirostra	53											●				●				
Sepia savignyi	54										●									
Sepia trygonina	55										●									
Sepia (*Metasepia*) tullbergi	56														●	(●)				
Sepiella inermis	57										●	●				●				
Sepiella japonica	58													●						
Sepiella ornata	59					●			●											
Sepiadarium kochi	60										●	●		●		●				
Sepiolina nipponensis	65													●		●				
Sepiola atlantica	66			●		●														
Sepiola birostrata	66													●						
Sepiola rondeleti	68			●		●	●													
Euprymna berryi	69										●	●		●		●				
Euprymna morsei	70											●		●		●				

SPECIES	PAGE	GEOGRAPHICAL DISTRIBUTION																		
		MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES																		
		18	21	27	31	34	37	41	47	48	51	57	58	61	67	71	77	81	87	88
Sepietta oweniana	71			●		●	●													
Rondeletiola minor	72					●	●													
Rossia antillensis	72				●															
Rossia bullisi	73				●															
Rossia macrosoma	74			●		●	●													
Rossia pacifica	75													●	●		●			
Rossia tortugaensis	76				●															
Neorossia caroli	76					●	●													
Semirossia equalis	77				●															
Semirossia tenera	78		●		●															
Loligo beka	84													●						
Loligo (Doryteuthis) bleekeri	84													●						
Loligo chinensis	86													●		●				
Loligo duvauceli	87										●	●		●		●				

SPECIES	PAGE	GEOGRAPHICAL DISTRIBUTION																		
		MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES																		
		18	21	27	31	34	37	41	47	48	51	57	58	61	67	71	77	81	87	88
Loligo edulis	88											●		●		●				
Loligo edulis budo	89													●						
Loligo forbesi	90			●		●	●				●									
Loligo gahi	91							●											●	
Loligo japonica	93													●						
Loligo kobiensis	94													●						
Loligo ocula	95				●															
Loligo opalescens	95														●		●			
Loligo pealei	97		●		●															
Loligo (Doryteuthis) plei	98				●			●												
Loligo reynaudi	100								●		●									
Loligo roperi	101				●															
Loligo sanpaulensis	102							●												
Loligo (Doryteuthis) sibogae	103													●		●				

SPECIES	PAGE	GEOGRAPHICAL DISTRIBUTION																		
		MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES																		
		18	21	27	31	34	37	41	47	48	51	57	58	61	67	71	77	81	87	88
Loligo (*Doryteuthis*) *singhalensis*	103										●	●		●		●				
Loligo surinamensis	105				●															
Loligo uyii	106													●		(●)				
Loligo vulgaris	107			●	●		●			●										
Sepioteuthis australis	109											●						●		
Sepioteuthis lessoniana	109										●	●		●		●	●	●		
Sepioteuthis sepioidea	111				●															
Alloteuthis africana	112					●			●											
Alloteuthis media	113			●		●	●													
Alloteuthis subulata	114			●		●	●													
Uroteuthis bartschi	115											(●)				●				
Lolliguncula brevis	115		●		●			●												
Lolliguncula mercatoris	117					●			●											
Lolliguncula panamensis	118																●		●	

SPECIES	PAGE	GEOGRAPHICAL DISTRIBUTION																		
		MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES																		
		18	21	27	31	34	37	41	47	48	51	57	58	61	67	71	77	81	87	88
Loliolopsis diomedeae	119																●		●	
Ancistrocheirus lesueuri	121			●					●		●			●		●				
Pterygioteuthis giardi	122		●	●	●	●	●	●	●		●	●				●	●	●	●	
Watasenia scintillans	123													●						
Taningia danae	124			●		●			●		●			●	●		●			
Ancistroteuthis lichtensteini	127				●	●	●		●							●				
Onychoteuthis banksi	128		●	●	●	●		●	●	●	●	●		●		●	●	●	●	
Onychoteuthis borealijaponica	129													●	●		●			
Moroteuthis ingens	130							●	●	●	●	●	●					●	●	●
Moroteuthis knipovitchi	131							●	●	●									●	●
Moroteuthis lönnbergi	132													●						
Moroteuthis robsoni	133							●	●	●	●	●							(●)	(●)
Moroteuthis robustus	134										●	●		●		●	●	●	●	
Gonatus fabricii	136		●	●																

SPECIES	PAGE	GEOGRAPHICAL DISTRIBUTION																		
		MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES																		
		18	21	27	31	34	37	41	47	48	51	57	58	61	67	71	77	81	87	88
Gonatus madokai	137													●						
Gonatus middendorffi	138													●	●					
Gonatus steenstrupi	139		●	●																
Gonatopsis borealis	140													●	●		●			
Gonatopsis makko	141													●	●					
Berryteuthis anonychus	142													●	●					
Berryteuthis magister	143													●	●					
Psychroteuthis glacialis	144							●	●	●	●		●							(●)
Pholidoteuthis adami	145		●		●															
Pholidoteuthis boschmai	146					●		●	●		●	●	●			●				
Architeuthis species	147		●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	
Histioteuthis bonnellii	149		●	●	●	●	●	●	●		●	(●)								
Histioteuthis dofleini	150			●	●	●					●			●	●		●	●		
Histioteuthis elongata	151		●	●	(●)	●	●													

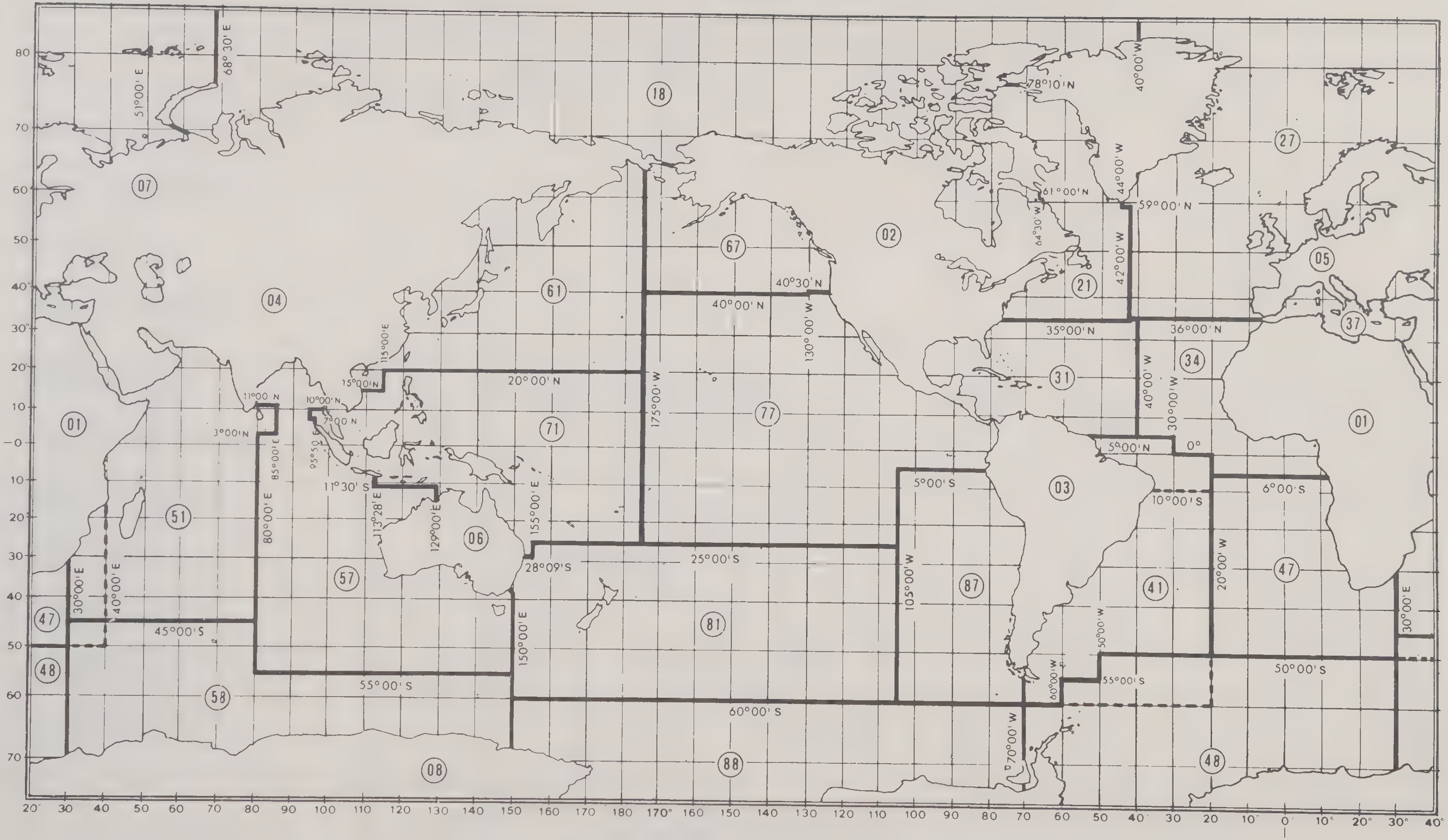
SPECIES	PAGE	GEOGRAPHICAL DISTRIBUTION																		
		MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES																		
		18	21	27	31	34	37	41	47	48	51	57	58	61	67	71	77	81	87	88
Alluroteuthis antarcticus	152									●			●							●
Bathyteuthis abyssicola	153		●			●		●	●	●							●		●	●
Brachioteuthis picta	154							●	●	●								●	●	●
Brachioteuthis riisei	155		●	●	●	●	●										●			
Illex argentinus	159							●												
Illex coindetii	160			●	●	●	●		●											
Illex illecebrosus	161		●	●	●															
Illex oxygonius	163		●		●	●														
Todaropsis eblanae	164			●		●	●		●			●				●		●		
Todarodes filippovae	166							●	●	●	●	●	●					●	●	●
Todarodes pacificus	167													●	●	●				
Todarodes sagittatus angolensis	168								●		●									
Todarodes sagittatus sagittatus	169	●		●		●	●	●	●											
Nototodarus gouldi	170											●				●		●		

SPECIES	PAGE	GEOGRAPHICAL DISTRIBUTION																		
		MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES																		
		18	21	27	31	34	37	41	47	48	51	57	58	61	67	71	77	81	87	88
Nototodarus hawaiiensis	172																●			
Nototodarus philippinensis	173													●		●				
Nototodatus sloani	174																	●		
Ommastrephes bartrami	175		●	●	●	●		●	●		●	●		●	●	●	●	●	●	
Ommastrephes caroli	177		●	●	●	●	●									●		(●)		
Ommastrephes pteropus	178		●	●	●	●	●	●	●											
Symplectoteuthis luminosa	179								●		●			●	●	●	●	●		
Symplectoteuthis oualaniensis	180										●	●		●	●	●	●	●		
Dosidicus gigas	181																●		●	
Ornithoteuthis antillarum	183		●		●	●		●	●											
Ornithoteuthis volatilis	184										●			●		●	●	●		
Martialia hyadesi	185							●		●								(●)	●	●
Hyaloteuthis pelagica	186				●	●		●			(●)	(●)		●		●	●	●	●	
Thysanoteuthis rhombus	187		●	●	●	●	●	●			●	●		●	●	●	●	●	●	

SPECIES	PAGE	GEOGRAPHICAL DISTRIBUTION																		
		MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES																		
		18	21	27	31	34	37	41	47	48	51	57	58	61	67	71	77	81	87	88
Mesonychoteuthis hamiltoni	189							●	●	●	●	●	●					●	●	●
Octopus aegina	192										●	●		●		●				
Octopus briareus	193				●			●												
Octopus burryi	194				●	●														
Octopus conispadiceus	195													●						
Octopus cyaneus	196										●	●		●		●	●	●		
Octopus defilippi	197				●	●	●	●	●		●	●								
Octopus dofleini	198										(●)			●	●		●			
Octopus dollfusi	199													●		●				
Octopus globosus	200										●	●		●		●				
Octopus hummelincki	201				●			●												
Octopus joubini	202				●															
Octopus lobensis	203							●												
Octopus macropus	204				●	(●)	●	●			●	●		●		●	●	●		

SPECIES	PAGE	GEOGRAPHICAL DISTRIBUTION																		
		MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES																		
		18	21	27	31	34	37	41	47	48	51	57	58	61	67	71	77	81	87	88
Octopus maya	205				●															
Octopus membranaceus	206										●	●		●		●	●			
Octopus selene	207																●			
Octopus tehuelchus	208							●												
Octopus tetricus	209											●								
Octopus variabilis	210													●						
Octopus vulgaris	211			●	●	●	●	●	●		●	●		●		●	(●)		(●)	
Octopus zonatus	212				●															
Danoctopus schmidti	213		●		●															
Euaxoctopus pillsburyae	214				●			(●)												
Scaeurgus unicirrhus	215				●		●	●			●	●		●			●			
Cistopus indicus	216										●	●		●		●				
Pteroctopus tetracirrhus	217			●	●	●	●	●												
Eledone cirrosa	218			●		●	●													

SPECIES	PAGE	GEOGRAPHICAL DISTRIBUTION																		
		MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES																		
		18	21	27	31	34	37	41	47	48	51	57	58	61	67	71	77	81	87	88
Eledone massyae	219							●												
Eledone moschata	220					●	●													
Pareledone species	221							●	●	●	●	●	●					●	●	●
Bathypolypus arcticus	222		●	●	●															
Benthoctopus januari	223				●			●												
Tetracheledone spinicirrhus	224				●															
Argonauta argo	225		●	●	●	●	●	●	●		●	●		●	●	●	●	●	●	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11°00 N
10°00' N
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Fig. 78 Major Fishing Areas for statistical purposes

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1855

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1880

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9. INDEX OF SCIENTIFIC AND INTERNATIONAL FAO NAMES

EXPLANATION OF THE SYSTEM

The index applies exclusively to Chapter 2 through 5, pertaining to information by species

Type faces used:

Italics	: Valid scientific names (genera and species)
	: Synonyms (preceeded by an asterisc)
Roman	: International (FAO) species names

PAGE

A

*_Abraliopsis joubini_ 123
*_Abraliopsis scintillans_ 123
abyssicola, Bathyteuthis 153
*_Acanthosepion enoplon_ 50
*_accidentalis, Sepioteuthis_ 111
aculeata, Sepia 30
adami, Pholidoteuthis 145
aegina, Octopus 192
*_affinis, Sepia_ 56
African cuttlefish 35
African squid 112
africana, Alloteuthis 112
*_aldrovandi, Octopus_ 218
*_alessandrini, Theliodioteuthis_ 121
Alloteuthis africana 112
Alloteuthis media 113
Alloteuthis subulata 114
Alluroteuthis antarcticus 152
*_aluei, Entomopsis_ 155
*_alumnus, Nautilus_ 26
*_ambiguus, Nautilus_ 26
*_Amplisepia parysatis_ 32
*_Amplisepia verreauni_ 32
Ancistrocheirus lesueuri 121
Ancistroteuthis lichtensteini 127
*_Ancistroteuthis robusta_ 134
Andrea cuttlefish 31
andreana, Sepia 31
*_andreanoides, Sepia_ 41
Angel squid 127
Angola flying squid 168
angolensis, Todarodes sagittatus 168
anonychus, Berryteuthis 142
*_anonychus, Gonatus_ 142
Antarctic cranch squid 189
Antarctic flying squid 166
Antarctic neosquid 152
Antarctic octopuses 221
antarcticus, Alluroteuthis 152
antillarum, Ornithoteuthis 183
antillensis, Rossia 72
Antilles bobtail 72
apama, Sepia 32
*_apollyon, Octopus dofleini_ 198
Arabian cuttlefish 33
arabica, Sepia 33
ARCHITEUTHIDAE 147
Architeuthis 147
arcticus, Bathypolypus 222
*_arcticus, Octopus_ 222
*_arctipinnis, Sepioteuthis_ 109
*_Arctosepia braggi_ 36
*_arcturi, Stigmatoteuthis_ 150
Argentine shortfin squid 159
argentinus, Illex 159
*_argentinus, Ommastrephes_ 159
argo, Argonauta 225
Argonauta argo 225
Argonauta común 225
Argonautas 225
Argonaute papier 225
Argonautes papier 225
ARGONAUTIDAE 225
Argonauts 225
Arm squids 154
*_Ascarosepion verreauxi_ 46

PAGE

Atlantic banded octopus 212
Atlantic bird squid 183
Atlantic bobtail 66
Atlantic gonate squid 139
*_atlantica, Histiopsis_ 149
atlantica, Sepiola 66
Australian giant cuttlefish 32
australis, Sepia 34
australis, Sepioteuthis 109

B

*_bairdi, Octopus_ 222
*_banksi, Loligo_ 128
banksi, Onychoteuthis 128
*_banksi, Onychoteuthis_ 129
*_bartrami, Loligo_ 175
bartrami, Ommastrephes 175
*_bartrami, Sthenoteuthis_ 175
Bartsch's squid 115
bartschi, Uroteuthis 115
Bathypolypus arcticus 222
BATHYTEUTHIDAE 153
Bathyteuthis abyssicola 153
Batiluria 153
Batilurias 153
Beka squid 84
beka, Loligo 84
Bellybutton nautilus 26
Benthoctopus januari 223
*_Benthoteuthis megalops_ 153
*_bermudensis, Octopus_ 204
berryi, Euprymna 69
Berryteuhis magister 143
Berryteuthis anonychus 142
bertheloti, Sepia 35
*_biangutata, Sepioteuthis_ 111
Big blue octopus 196
Bigeye inshore squid 95
Bigfin reef squid 110
*_bilineata, Sepioteuthis_ 109
birostrata, Sepiola 66
*_biserialis, Sepia_ 37
*_bleekeri, Doryteuthis_ 84
bleekeri, Loligo (Doryteuthis) 84
Bobtail squids 61
*_bonelliana, Cranchia_ 149
*_bonelliana, Histioteuthis_ 149
*_bonnellii, Cranchia_ 149
bonnellii, Histioteuthis 149
Boreal clubhook squid 129
borealijaponica, Onychoteuthis 129
borealis, Gonatopsis 140
Boreoatlantic gonate squid 136
Boreopacific gonate squid 140
boschmai, Pholidoteuthis 146
*_boscii, Octopus_ 209
Bottletail squid 60
Bottletail squids 60
BRACHIOTEUTHIDAE 154
Brachioteuthis picta 154
Brachioteuthis riisei 155
*_braggi, Arctosepia_ 36
braggi, Sepia 36
Braquiluria común 155

PAGE

Braquiluria moteada 154
Braquilurias 154
*_brasiliensis, Loligo_ 98
*_brasiliensis, Loligo_ 102
*_brevia, Moschites_ 219
brevimana, Sepia 37
*_brevipinna, Loligo_ 115
*_brevis, Loligo_ 115
brevis, Lolliguncula 115
*_brevis, Sepioteuthis_ 109
briareus, Octopus 193
Broadback cuttlefish 54
Broadclub cuttlefish 42
Broadtail shortfin squid 160
*_brogniartii, Loligo_ 160
Brownstriped octopus 194
Budo squid 89
budo, Loligo edulis 89
bullisi, Rossia 73
Bully bobtail 73
Bumblebee octopus 201
burryi, Octopus 194
*_bursarius, Cistopus_ 216
Butterfly bobtail 67

C

Calamar 107
Calamar balilla 106
Calamar beka 84
Calamar budo 89
Calamar buril 104
Calamar dardo 119
Calamar de arrecife 111
Calamar de Sao Paulo 102
Calamar dedal 116
Calamar dedal de Guinea 117
Calamar dedal panameño 118
Calamar del Cabo 100
Calamar doigtier panaméen 118
Calamar espada 88
Calamar flecha 98
Calamar índico 87
Calamar insular 101
Calamar japonés 93
Calamar kobí 94
Calamar lanceolado 85
Calamar manopla 110
Calamar mitrado 86
Calamar ojigrande 95
Calamar opalescente 96
Calamar pálido 97
Calamar patagónico 92
Calamar roquero austral 109
Calamar siboga 103
Calamar surinamés 105
Calamar veteado 90
Calamares 80
Calamarete 115
Calamaretes 80
Calamarín africano 112
Calamarín menor 113
Calamarín picudo 114
Calamarines 80
*_Calliteuthis elongata_ 151

PAGE

Calmar à gros yeux 95
Calmar baril 104
Calmar budo 89
Calmar cracheur 84
Calmar créole 101
Calmar de roche austral 109
Calmar de Sao Paulo 102
Calmar doigtier commun 116
Calmar doigtier de Guinée 117
Calmar du Cap 100
Calmar du Surinam 105
Calmar épée 88
Calmar flèche 98
Calmar fléchette 119
Calmar indien 87
Calmar japonais 93
Calmar kobi 94
Calmar lancette 85
Calmar mignon 106
Calmar mitre 86
Calmar opale 96
Calmar patagon 92
Calmar ris 111
Calmar siboga 103
Calmar tépo 115
Calmar tonnelet 110
Calmar totam 97
Calmars 80
Calmars 156
Calmars côtiers 80
Cape Hope squid 100
*_capensis, Sepia_ 34
Caribbean reef octopus 193
Caribbean reef squid 111
Carol bobtail 76
caroli, Neorossia 76
caroli, Ommastrephes 177
*_caroli, Ommatostrephes_ 177
*_caroli, Rossia_ 76
Casseron africain 112
Casseron bambou 113
Casseron commun 114
Casserons 80
Chambered nautiluses 25
Chestnut octopus 195
chinensis, Loligo 86
Chipiloua commun 187
Chipilouas 187
Chipirón volantín 187
Chipirones 187
*_chiroctes, Loliolopsis_ 119
Choquito con punta 50
Choquito sin punta 38
*_chromatus, Octopus_ 204
*_chuni, Stigmatoteuthis_ 150
*_cirrhosus, Octopus_ 218
cirrosa, Eledone 218
*_Cistopus bursarius_ 216
Cistopus indicus 216
Cloquitos 27
*_clouei, Entomopsis_ 155
*_cocco, Octopus_ 215
Coffeebean scaled squid 146
*_coindeti, Illex illecebrosus_ 160
coindetii, Illex 160
*_coindetii, Loligo_ 160
*_collinsi, Histioteuthis_ 149
Combed octopus 219
Common arm squid 155
Common bobtail 71
Common clubhook squid 128

PAGE

Common cuttlefish 47
Common octopus 211
conispadiceus, Octopus 195
Cornet archange 127
Cornet boréal 129
Cornet commun 130
Cornet crocha 128
Cornet japonais 132
Cornet lisse 131
Cornet mange-piquants 134
Cornet rugueux 133
Cornets 125
Cranch squids 188
*_Cranchia bonelliana_ 149
*_Cranchia bonnellii_ 149
CRANCHIIDAE 188
Cranquiluria antártica 189
Cranquilurias 188
*_Cucioteuthis unguiculata_ 124
*_Cucioteuthis unguiculatus_ 124
Curvespine cuttlefish 53
Cuttlefishes 27
*_cuvieri, Octopus_ 204
cyaneus, Octopus 196

D

Dana octopus 213
Dana octopus squid 124
danae, Taningia 124
Danoctopus schmidti 213
Dart squid 119
Deepsea squid 153
Deepsea squids 153
defilippi, Octopus 197
Diamondback squid 187
*_diomedeae, Loligo_ 119
diomedeae, Loliolopsis 119
dofleini, Histioteuthis 150
dofleini, Octopus 198
*_dofleini, Polypus_ 198
*_dolfleini, Stigmatoteuthis_ 150
dollfusi, Octopus 199
*_Doraseplon trygoninum_ 55
*_Doryteuthis bleekeri_ 84
*_Doryteuthis kensaki_ 88
*_Doryteuthis plei_ 98
*_Doryteuthis plei_ 102
*_Doryteuthis sibogae_ 103
*_Dosidicus eschrichti_ 181
Dosidicus gigas 181
*_Dosidicus steenstrupi_ 181
Double-ear bobtail 69
duvauceli, Loligo 87
Dwarf bobtail 68

PAGE

E

*_eblanae, Loligo_ 164
eblanae, Todaropsis 164
edulis, Loligo 88
*_ehrhardti, Sepioteuthis_ 111
Eledone cirrosa 218
Elédone commune 218
Eledone massyae 219
Eledone moschata 220
Elédone musquée 220
Elédone peigne 219
Elédones antarctiques 221
elegans, Sepia 37
Elegant cuttlefish 38
*_elliptica, Sepia_ 40
elobyana, Sepia 39
*_elongata, Calliteuthis_ 151
elongata, Histioteuthis 151
Elongate jewell squid 151
Emperor nautilus 26
Encornet 107
Encornet ailes courtes 142
Encornet atlantique 139
Encornet atlantoboréal 136
Encornet austral 144
Encornet bande voilette 180
Encornet boréopacifique 140
Encornet boubou 122
Encornet bouquet 172
Encornet bras courts 138
Encornet bras courts commun 155
Encornet bras courts orné 154
Encornet cachalot 121
Encornet carol 177
Encornet dos orange 178
Encornet étoile 185
Encornet éventail 170
Encornet fuiripin 173
Encornet géant 182
Encornet lumière 123
Encornet lumineux 179
Encornet madokai 137
Encornet mako 141
Encornet minami 174
Encornet monstre 147
Encornet oiseau 183
Encornet outre commun 189
Encornet planeur 184
Encornet poulpe dana 124
Encornet rouge 160
Encornet rouge à pointe 163
Encornet rouge argentin 159
Encornet rouge nordique 162
Encornet suçoir 143
Encornet veiné 90
Encornet vitreux 186
Encornet volant 175
Encornets 80
Encornets 120
Encornets 135
Encornets 144
Encornets 156
Encornets bras courts 154
Encornets monstres 147
Encornets outres 188
Encornets poulpes 124
Enope squids 120

PAGE

Enoploluria centellante 123
Enoploluria orejuda 122
Enoploluria rómbica 121
Enoplolurias 120
*_enoplon, Acanthosepion_ 50
ENOPLOTEUTHIDAE 120
*_Entomopsis aluei_ 155
*_Entomopsis clouei_ 155
*_Entomopsis velaini_ 155
equalis, Semirossia 77
*_eschrichti, Dosidicus_ 181
esculenta, Sepia 40
*_etheridgei, Loligo_ 86
Euaxoctopus pillsburyae 214
*_Eucleoteuthis luminosa_ 179
Euprymna berryi 69
Euprymna morsei 70
*_Euprymna similis_ 70
European common squid 114
European flying squid 169
European squid 107

F

fabricii, Gonatus 136
*_fabricii, Gonatus_ 139
*_fabricii, Onychoteuthis_ 136
*_faeroensis, Octopus_ 222
*_fang-siao, Octopus_ 206
filippovae, Todarodes 166
*_filosus, Octopus_ 201
Flowervas jewell squid 150
Flying squids 156
forbesi, Loligo 90
*_formosana, Loligo_ 86
*_formosana, Sepia_ 51
Fourhorn octopus 217
Frog cuttlefish 46

G

gahi, Loligo 91
Giant squid 147
Giant squids 147
giardi, Pterygioteuthis 122
*_giganteus, Ommastrephes_ 181
gigas, Dosidicus 181
*_gigas, Ommastrephes_ 181
*_gilbertianus, Octopus_ 198
Glacial squid 144
Glacial squids 144
glacialis, Psychroteuthis 144
Glassy flying squid 186
Globe octopus 200
Globito 68
Globito antillano 72
Globito cabezudo 73
Globito carolino 76
Globito de Tortugas 76

PAGE

Globito del Pacífico boreal 75
Globito reluciente 77
Globito robusto 74
Globito tierno 78
Globitos 61
globosus, Octopus 200
Gloomy octopus 209
Golden cuttlefish 40
Gonalura alicorta 142
Gonalura atlántica 139
Gonalura atlantoboreal 136
Gonalura bracicorta 138
Gonalura madokai 137
Gonalura magister 143
Gonalura mako 141
Gonalura pacificoboreal 140
Gonaluras 135
Gonate squids 135
GONATIDAE 135
Gonatopsis borealis 140
Gonatopsis makko 141
*_Gonatus anonychus_ 142
Gonatus fabricii 136
*_Gonatus fabricii_ 139
Gonatus madokai 137
*_Gonatus magister_ 143
Gonatus middendorffi 138
*_Gonatus septemdentatus_ 143
Gonatus steenstrupi 139
Gould's flying squid 170
gouldi, Nototodarus 170
*_gouldi, Nototodarus sloani_ 170
*_gouldi, Ommastrephes_ 170
*_gracilis, Verrillida_ 155
*_grandipes, Loligo edulis_ 89
Greater argonaut 225
Greater hooked squid 130
Greater shining bobtail 77
*_groenlandicus, Octopus_ 222
Gros poulpe bleu 196
Guinean cuttlefish 39
Guinean thumbstall squid 117
*_guinensis, Sepioteuthis_ 109

H

hamiltoni, Mesonychoteuthis 189
Hawaiian flying squid 172
hawaiiensis, Nototodarus 172
*_hawaiiensis, Nototodarus sloani_ 172
*_hawaiiensis, Ommastrephes_ 172
*_hemiptera, Loligo_ 115
*_hercules, Sepia_ 42
*_Heteroteuthis tenera_ 78
*_heylei, Sepiella_ 58
*_Histiopsis atlantica_ 149
HISTIOTEUTHIDAE 148
*_Histioteuthis bonelliana_ 149
Histioteuthis bonnellii 149
*_Histioteuthis collinsi_ 149
Histioteuthis dofleini 150
Histioteuthis elongata 151
*_Histioteuthis rüppelli_ 149
*_hongkongensis, Octopus_ 198
Hooded cuttlefish 52

PAGE
PAGINA

Hooked squids 125
Horned octopus 218
*_horsti, Octopus_ 196
hummelincki, Octopus 201
hyadesi, Martialia 185
Hyaloteuthis pelagica 186

I

illecebrosus, Illex 161
*_illecebrosus, Illex illecebrosus_ 161
*_illecebrosus, Loligo_ 161
*_illecebrosus, Ommastrephes_ 161
Illex argentinus 159
Illex coindetii 160
Illex illecebrosus 161
*_Illex illecebrosus coindeti_ 160
*_Illex illecebrosus illecebrosus_ 161
Illex oxygonius 163
Indian squid 87
*_indica, Sepia_ 30
*_indica, Sepioteuthis_ 109
indicus, Cistopus 216
*_indicus, Octopus_ 216
inermis, Sepiella 56
ingens, Moroteuthis 130
*_ingens, Onychoteuthis_ 130
*_Inioteuthis morsei_ 70
Inshore squids 80
*_insignis, Nototodarus_ 174
Island inshore squid 101
*_italica, Sepia_ 37

J

januari, Benthoctopus 223
*_januari, Octopus_ 223
January octopus 223
Japanese bobtail 65
Japanese flying squid 167
Japanese hooked squid 132
Japanese spineless cuttlefish 58
Japanese squid 93
japonica, Sepiella 58
Jewell squids 148
Jibia africana 35
Jibia antártica 166
Jibia gigante 182
Jibias 156
*_joubini, Abraliopsis_ 123
joubini, Octopus 202
Joyeluria alargada 151
Joyeluria floral 150
Joyeluria membranosa 149
Joyelurias 148
Jumbo flying squid 182

PAGE
PAGINA

K

*_kagoshimensis, Octopus_ 192
*_kensaki, Doryteuthis_ 88
Kisslip cuttlefish 44
knipovitchi, Moroteuthis 131
Kobi cuttlefish 41
Kobi squid 94
kobiensis, Loligo 94
kobiensis, Sepia 41
kochii, Sepiadarium 60
*_krempfi, Sepioteuthis_ 109

L

latimamus, Sepia 42
Lentil bobtail 72
*_lentus, Octopus_ 222
LEPIDOTEUTHIDAE 145
Lesser flying squid 164
Lesser shining bobtail 78
lessoniana, Sepioteuthis 109
*_Lestoteuthis robusta_ 134
*_lesuerii, Onychoteuthis_ 121
lesueuri, Ancistrocheirus 121
lichtensteini, Ancistroteuthis 127
*_lichtensteini, Onychoteuthis_ 127
*_liliana, Solitosepia_ 46
Lilliput longarm octopus 197
Little squid 106
Lobed octopus 203
lobensis, Octopus 203
LOLIGINIDAE 80
Loligo (Doryteuthis) bleekeri 84
Loligo (Doryteuthis) plei 98
Loligo (Doryteuthis) sibogae 103
Loligo (Doryteuthis) singhalensis 103
*_Loligo banksi_ 128
*_Loligo bartrami_ 175
Loligo beka 84
*_Loligo brasiliensis_ 98
*_Loligo brasiliensis_ 102
*_Loligo brevipinna_ 115
*_Loligo brevis_ 115
*_Loligo brogniartii_ 160
Loligo chinensis 86
*_Loligo coindetii_ 160
*_Loligo diomedeae_ 119
Loligo duvauceli 87
*_Loligo eblanae_ 164
Loligo edulis 88
Loligo edulis budo 89
*_Loligo edulis grandipes_ 89
*_Loligo etheridgei_ 86
Loligo forbesi 90
*_Loligo formosana_ 86
Loligo gahi 91
*_Loligo hemiptera_ 115
*_Loligo illecebrosus_ 161
Loligo japonica 93
Loligo kobiensis 94
*_Loligo marmorae_ 113

PAGE

Loligo ocula 95
Loligo opalescens 95
*_Loligo oshimai_ 87
*_Loligo oualaniensis_ 180
*_Loligo pallida_ 97
*_Loligo patagonica_ 91
Loligo pealei 97
*_Loligo pillae_ 160
*_Loligo piscatorum_ 161
Loligo reynaudi 100
Loligo roperi 101
*_Loligo sagittata_ 160
*_Loligo sagittata_ 164
*_Loligo sagittatus_ 169
Loligo sanpaulensis 102
*_Loligo sepioidea_ 111
*_Loligo stearnsi_ 95
*_Loligo subulata_ 114
*_Loligo sumatrensis_ 84
Loligo surinamensis 105
*_Loligo tagoi_ 106
*_Loligo todarus_ 169
Loligo uyii 106
*_Loligo vanicoriensis_ 180
Loligo vulgaris 107
*_Loliolopsis chiroctes_ 119
Loliolopsis diomedeae 119
Lolliguncula brevis 115
Lolliguncula mercatoris 117
Lolliguncula panamensis 118
Long barrel squid 104
Longarm cuttlefish 43
Longfin inshore squid 97
*_longimanus, Octopus_ 204
longipes, Sepia 43
lönnbergi, Moroteuthis 132
lorigera, Sepia 43
Loutène abyssale 153
Loutène australe 152
Loutène battoir 146
Loutène bonnet 149
Loutène commune 145
Loutène longue 151
Loutène vase 150
Loutènes 145
Loutènes 148
Loutènes 152
Loutènes abyssales 153
*_luminosa, Eucleoteuthis_ 179
luminosa, Symplectoteuthis 179
Luminous flying squid 179
*_lunulata, Sepioteuthis_ 109
Luria boreal 129
Luria escamuda 145
Luria escamuda cafetal 146
Luria ganchuda 128
Luria glacial 144
Luria paloma 127
Lurias 125
Lurias escamudas 145
Lurias glaciales 144
Lurión común 130
Lurión japonés 132
Lurión liso 131
Lurión máximo 134
Lurión rugoso 133
Luriones 125
lycidas, Sepia 44

PAGE

M

macromphalus, Nautilus 26
macropus, Octopus 204
macrosoma, Rossia 74
*_macrosoma, Sepiola_ 74
*_Macrotritopus_ 197
Madokai gonate squid 137
madokai, Gonatus 137
madokai, Sepia 45
Madokai's cuttlefish 45
magister, Berryteuhis 143
*_magister, Gonatus_ 143
*_maindroni, Sepiella_ 56
makko, Gonatopsis 141
Mako gonate squid 141
*_malayana, Sepioteuthis_ 109
*_malayense, Sepiadarium_ 60
Map octopus 214
Marbled octopus 199
*_marginalis, Nautilus perforatus_ 26
*_marmorae, Loligo_ 113
*_marmoratus, Octopus_ 196
Martialia hyadesi 185
massyae, Eledone 219
*_mauritania, Sepioteuthis_ 109
maya, Octopus 205
media, Alloteuthis 113
*_media, Sepia_ 113
*_megalops, Benthoteuthis_ 153
Megaluria 147
Megalurias 147
membranaceus, Octopus 206
mercatoris, Lolliguncula 117
*_mercatoris, Sepia_ 35
Mesonychoteuthis hamiltoni 189
mestus, Sepia 46
Mexican four-eyed octopus 205
Mickey mouse squids 61
*_microcheirus, Sepia (Sepiella)_ 56
middendorffi, Gonatus 138
Midsize squid 113
Mimika bobtail 70
minor, Rondeletiola 72
*_minor, Sepietta_ 72
Mitre squid 86
Moon octopus 207
*_moretoni, Nautilus perforatus_ 26
Moroteuthis ingens 130
Moroteuthis knipovitchi 131
Moroteuthis lönnbergi 132
Moroteuthis robsoni 133
Moroteuthis robustus 134
morsei, Euprymna 70
*_morsei, Inioteuthis_ 70
moschata, Eledone 220
*_moschatus, Octopus_ 220
*_Moschites brevia_ 219
*_mozambica, Sepia_ 42
murrayi, Sepia 46
Musky octopus 220

PAGE

N

Nautile bouton 26
Nautile flammé 26
Nautile ombligo 26
Nautiles 25
NAUTILIDAE 25
Nautilo común 26
Nautilos 25
*_Nautilus alumnus_ 26
*_Nautilus ambiguus_ 26
Nautilus macromphalus 26
*_Nautilus perforatus marginalis_ 26
*_Nautilus perforatus moretoni_ 26
*_Nautilus perforatus perforatus_ 26
Nautilus pompilius 26
*_Nautilus repertus_ 26
*_Nautilus stenomphalus_ 26
Needle cuttlefish 30
*_neoguinaica, Sepioteuthis_ 109
Neoluria antártica 152
Neolurias 152
Neon flying squid 175
Neorossia caroli 76
Neosquids 152
NEOTEUTHIDAE 152
nipponensis, Sepiolina 65
*_nipponensis, Stoloteuthis_ 65
North Atlantic octopus 222
North Pacific bobtail 75
North Pacific giant octopus 198
Northern shortfin squid 162
*_Notodarus sloani sloani_ 174
Nototodarus gouldi 170
Nototodarus hawaiiensis 172
*_Nototodarus insignis_ 174
Nototodarus philippinensis 173
Nototodarus sloani 174
*_Nototodarus sloani gouldi_ 170
*_Nototodarus sloani hawaiiensis_ 172
*_Nototodarus sloani philippinensis_ 173
*_nuchalis, Thysanoteuthis_ 187
*_nympha, Verrilliola_ 155

O

*_obesus, Octopus_ 222
*_oceanicus, Ommastrephes_ 180
*_ocellatus, Octopus_ 206
OCTOPODIDAE 191
OCTOPOTEUTHIDAE 124
Octopus aegina 192
*_Octopus aldrovandi_ 218
*_Octopus arcticus_ 222
*_Octopus bairdi_ 222
*_Octopus bermudensis_ 204
*_Octopus boscii_ 209
Octopus briareus 193
Octopus burryi 194
*_Octopus chromatus_ 204
*_Octopus cirrhosus_ 218
*_Octopus cocco_ 215

PAGE

Octopus conispadiceus 195
*_Octopus cuvieri_ 204
Octopus cyaneus 196
Octopus defilippi 197
Octopus dofleini 198
*_Octopus dofleini apollyon_ 198
Octopus dollfusi 199
*_Octopus faeroensis_ 222
*_Octopus fang-siao_ 206
*_Octopus filosus_ 201
*_Octopus gilbertianus_ 198
Octopus globosus 200
*_Octopus groenlandicus_ 222
*_Octopus hongkongensis_ 198
*_Octopus horsti_ 196
Octopus hummelincki 201
*_Octopus indicus_ 216
*_Octopus januari_ 223
Octopus joubini 202
*_Octopus kagoshimensis_ 192
*_Octopus lentus_ 222
Octopus lobensis 203
*_Octopus longimanus_ 204
Octopus macropus 204
*_Octopus marmoratus_ 196
Octopus maya 205
Octopus membranaceus 206
*_Octopus moschatus_ 220
*_Octopus obesus_ 222
*_Octopus ocellatus_ 206
*_Octopus punctatus_ 198
*_Octopus rugosus_ 201
Octopus selene 207
Octopus squids 124
Octopus tehuelchus 208
*_Octopus tetracirrhus_ 217
Octopus tetricus 209
*_Octopus unicirrhus_ 215
Octopus variabilis 210
*_Octopus vincenti_ 194
Octopus vulgaris 211
Octopus zonatus 212
Octopuses 191
ocula, Loligo 95
officinalis, Sepia 47
Old woman octopus 216
Oman cuttlefish 49
omani, Sepia 49
*_Ommastostrephes pteropus_ 178
*_Ommastrephes argentinus_ 159
Ommastrephes bartrami 175
Ommastrephes caroli 177
*_Ommastrephes giganteus_ 181
*_Ommastrephes gigas_ 181
*_Ommastrephes gouldi_ 170
*_Ommastrephes hawaiiensis_ 172
*_Ommastrephes illecebrosus_ 161
*_Ommastrephes oceanicus_ 180
*_Ommastrephes pacificus_ 167
*_Ommastrephes pelagicus_ 186
Ommastrephes pteropus 178
*_Ommastrephes robusta_ 134
*_Ommastrephes sagittatus_ 169
*_Ommastrephes sloani_ 174
*_Ommastrephes sloani pacificus_ 167
*_Ommastrephes volatilis_ 184
OMMASTREPHIDAE 156
*_Ommatostrephes caroli_ 177
*_Ommatostrephes sagittatus_ 169
ONYCHOTEUTHIDAE 125
Onychoteuthis banksi 128

PAGE

*_Onychoteuthis banksi_ 129
Onychoteuthis borealijaponica 129
*_Onychoteuthis fabricii_ 136
*_Onychoteuthis ingens_ 130
*_Onychoteuthis lesuerii_ 121
*_Onychoteuthis lichtensteini_ 127
opalescens, Loligo 95
Opalescent inshore squid 96
Orangeback flying squid 178
orbignyana, Sepia 50
*_ornata, Sepia_ 59
ornata, Sepiella 59
Ornate arm squid 154
Ornate cuttlefish 59
Ornithoteuthis antillarum 183
Ornithoteuthis volatilis 184
*_oshimai, Loligo_ 87
*_oualaniensis, Loligo_ 180
oualaniensis, Symplectoteuthis 180
*_ovata, Sepioteuthis_ 111
oweniana, Sepietta 71
*_oweniana, Sepiola_ 71
oxygonius, Illex 163

P

pacifica, Rossia 75
*_pacificus, Ommastrephes_ 167
*_pacificus, Ommastrephes sloani_ 167
pacificus, Todarodes 167
Paintpot cuttlefish 56
*_pallida, Loligo_ 97
*_palmata, Sepia_ 32
Panama brief squid 118
panamensis, Lolliguncula 118
Paper nautiluses 225
*_Parateuthis tunicata_ 152
Pareledone 221
*_parysatis, Amplisepia_ 32
*_patagiatus, Scaeurgus_ 215
Patagonian squid 92
*_patagonica, Loligo_ 91
pealei, Loligo 97
pelagica, Hyaloteuthis 186
*_pelagica, Sepia_ 186
*_pelagicus, Ommastrephes_ 186
*_perforatus, Nautilus perforatus_ 26
Pharaoh cuttlefish 51
pharaonis, Sepia 51
Philippine flying squid 173
philippinensis, Nototodarus 173
*_philippinensis, Nototodarus sloani_ 173
Pholidoteuthis adami 145
Pholidoteuthis boschmai 146
picta, Brachioteuthis 154
Pieuvre 211
Pieuvres 191
*_pillae, Loligo_ 160
pillsburyae, Euaxoctopus 214
Pink cuttlefish 50
*_piscatorum, Loligo_ 161
*_plei, Doryteuthis_ 98
*_plei, Doryteuthis_ 102
plei, Loligo (Doryteuthis) 98
*_Polypus dofleini_ 198

PAGE

*_Polypus variabilis_ 210
pompilius, Nautilus 26
Pota angolense 168
Pota argentina 159
Pota australiana 170
Pota cárdena 180
Pota costera 164
Pota estrellada 186
Pota europea 169
Pota festoneada 185
Pota filipina 173
Pota hawaiana 172
Pota japonesa 167
Pota luminosa 179
Pota naranja 178
Pota neozelandesa 174
Pota norteña 162
Pota pájaro 183
Pota planeadora 184
Pota puntiaguda 163
Pota saltadora 175
Pota velera 177
Pota voladora 160
Potas 156
Poulpe à longs bras 197
Poulpe à quatre cornes 217
Poulpe à quatre yeux 206
Poulpe à rayures bleues 194
Poulpe boreal 222
Poulpe bourdon 201
Poulpe casse-noix 195
Poulpe cornu 224
Poulpe dana 213
Poulpe des sables 192
Poulpe filamenteux 223
Poulpe fouet 210
Poulpe géant (nord- Pacifique) 198
Poulpe globe 200
Poulpe licorne 215
Poulpe lierre 214
Poulpe lune 207
Poulpe mexicain 205
Poulpe nain 199
Poulpe pygmé 202
Poulpe ris 193
Poulpe séganliou 203
Poulpe sombre 209
Poulpe tacheté 204
Poulpe téhuelche 208
Poulpe vieille femme 216
Poulpe zèbre 212
Poulpes 191
prashadi, Sepia 52
PSYCHROTEUTHIDAE 144
Psychroteuthis glacialis 144
Pteroctopus tetracirrhus 217
*_pteropus, Ommastostrephes_ 178
pteropus, Ommastrephes 178
Pterygioteuthis giardi 122
Pulpito monedero 213
Pulpito patilargo 197
Pulpito violáceo 222
Pulpitos 191
Pulpo abejorro 201
Pulpo acebrado 212
Pulpo almizclado 220
Pulpo antenado 210
Pulpo azulón 196
Pulpo bianco 218
Pulpo común 211
Pulpo cornudo 224

PAGE

Pulpo cuatro cuernos 217
Pulpo de arrecife 193
Pulpo desflecado 219
Pulpo [illegible] 195
Pulpo filamentoso 223
Pulpo gigante 198
Pulpo globoso 200
Pulpo granuloso 194
Pulpo lampazo 214
Pulpo lobero 203
Pulpo lunero 207
Pulpo manchado 204
Pulpo marmóreo 199
Pulpo membranoso 206
Pulpo mexicano 205
Pulpo perforado 216
Pulpo pigmeo 202
Pulpo reticulado 192
Pulpo tehuelche 208
Pulpo tétrico 209
Pulpo unicornio 215
Pulpos 191
Pulpos antárticos 221
Pulpota 124
Pulpotas 124
punctatus, Octopus 198
Purpleback flying squid 180
Pygmy octopus 202

R

**rappiana, Sepia* 42
Reaper cuttlefish 46
recurvirostra, Sepia 53
**repertus, Nautilus* 26
reynaudi, Loligo 100
Rhomboid squids 187
rhombus, Thysanoteuthis 187
riisei, Brachioteuthis 155
**riisei, Tracheloteuthis* 155
robsoni, Moroteuthis 133
**robsoni, Sepia* 45
Robust clubhook squid 134
**robusta, Ancistroteuthis* 134
**robusta, Lestoteuthis* 134
**robusta, Ommastrephes* 134
robustus, Moroteuthis 134
rondeleti, Sepiola 68
Rondeletiola 72
Rondeletiola minor 72
Rondeletiolas 61
roperi, Loligo 101
Rossia antillensis 72
Rossia bullisi 73
**Rossia caroli* 76
Rossia macrosoma 74
Rossia pacifica 75
**Rossia tenera* 78
Rossia tortugaensis 76
**rostrata, Sepia* 37
Roundear enope squid 122
**rouxi, Sepia* 51
**rubens, Sepia* 50
Rugose hooked squid 133
**rugosus, Octopus* 201

PAGE

**rupelloria, Sepia* 37
**rüppelli, Histioteuthis* 149

S

**sagittata, Loligo* 160
**sagittata, Loligo* 164
**sagittatus, Loligo* 169
**sagittatus, Ommastrephes* 169
**sagittatus, Ommatostrephes* 169
sagittatus, Todarodes sagittatus 169
Sandbird octopus 192
sanpaulensis, Loligo 102
Sao Paulo squid 102
sayignyi, Sepia 54
**Scaeurgus patagiatus* 215
**Scaeurgus titanotus* 217
Scaeurgus unicirrhus 215
Scaled squid 145
Scaled squids 145
schmidti, Danoctopus 213
Schoolmaster gonate squid 143
**scintillans, Abraliopsis* 123
scintillans, Watasenia 123
Seiche africaine 35
Seiche aiguille 30
Seiche andreana 31
Seiche araignée 44
Seiche australe 34
Seiche baisers 44
Seiche capuchon 52
Seiche commune 47
Seiche d'Arabie 33
Seiche d'Oman 49
Seiche de Guinée 39
Seiche dorée 40
Seiche élégante 38
Seiche encrier 56
Seiche géante 32
Seiche gracile 36
Seiche grandes mains 42
Seiche grenouille 46
Seiche gros dos 54
Seiche hameçon 53
Seiche kobi 41
Seiche madokai 45
Seiche moisson 46
Seiche petites mains 37
Seiche pharaon 51
Seiche pieuvre 43
Seiche rosée 50
Seiche trident 55
Seiches 27
selene, Octopus 207
Semirossia equalis 77
Semirossia tenera 78
Sepia (Metasepia) tullbergi 56
**Sepia (Sepiella) microcheirus* 56
Sepia aculeata 30
**Sepia affinis* 56
Sepia andreana 31
**Sepia andreanoides* 41
Sepia apama 32
Sepia arabica 33
Sepia arábiga 33

PAGE

Sepia austral 34
Sepia australis 34
Sepia bertheloti 35
*_Sepia biserialis_ 37
Sepia braggi 36
Sepia brazolargo 43
Sepia brevimana 37
*_Sepia capensis_ 34
Sepia caperuza 52
Sepia común 47
Sepia con punta 30
Sepia dorada 40
Sepia elegans 37
*_Sepia elliptica_ 40
Sepia elobyana 39
Sepia esculenta 40
Sepia faraónica 51
*_Sepia formosana_ 51
Sepia ganchuda 53
Sepia gigante 32
Sepia grácil 36
Sepia guineana 39
*_Sepia hercules_ 42
*_Sepia indica_ 30
Sepia inerme 57
Sépia inerme 57
Sépia inerme japonaise 58
Sepia inerme japonesa 58
*_Sepia italica_ 37
Sepia kobí 41
Sepia kobiensis 41
Sepia labiada 44
Sepia latimamus 42
Sepia longipes 43
Sepia loriga 44
Sepia lorigera 43
Sepia lycidas 44
Sepia madokai 45
Sepia mazicorta 37
Sepia mazuda 42
*_Sepia media_ 113
*_Sepia mercatoris_ 35
Sepia mestus 46
*_Sepia mozambica_ 42
Sepia murrayi 46
Sepia officinalis 47
Sepia omaní 49
Sepia omani 49
Sepia orbignyana 50
Sepia orlada 59
*_Sepia ornata_ 59
Sépia ornée 59
*_Sepia palmata_ 32
*_Sepia pelagica_ 186
Sepia pharaonis 51
Sepia prashadi 52
Sepia ranuda 46
*_Sepia rappiana_ 42
Sepia recurvirostra 53
*_Sepia robsoni_ 45
Sepia robusta 54
*_Sepia rostrata_ 37
*_Sepia rouxi_ 51
*_Sepia rubens_ 50
*_Sepia rupelloria_ 37
Sepia sayignyi 54
Sepia segadora 46
*_Sepia singaporensis_ 53
*_Sepia sinope_ 34
*_Sepia subaculeata_ 44
*_Sepia tigris_ 51

PAGE

Sepia tintero 56
Sepia tridente 55
Sepia trygonina 55
*_Sepia winckworthi_ 37
SEPIADARIIDAE 60
Sepiadarium kochii 60
*_Sepiadarium malayense_ 60
Sepias 27
*_Sepiella heylei_ 58
Sepiella inermis 56
Sepiella japonica 58
*_Sepiella maindroni_ 56
Sepiella ornata 59
Sepieta común 71
Sepietas 61
*_Sepietta minor_ 72
Sepietta oweniana 71
SEPIIDAE 27
*_sepioidea, Loligo_ 111
sepioidea, Sepioteuthis 111
Sepiola atlantica 66
Sepiola atlántica 66
Sepiola birostrata 66
Sepiola colibrí 69
*_Sepiola macrosoma_ 74
Sepiola mariposa 67
Sepiola mimika 70
*_Sepiola oweniana_ 71
Sepiola rondeleti 68
Sepiolas 61
Sépiole bobie 72
Sépiole bouledogue 73
Sépiole calamarette 78
Sépiole carolette 76
Sépiole colibri 69
Sépiole commune 71
Sépiole cracheuse 77
Sépiole du Pacifique boréal 75
Sépiole grandes oreilles 66
Sépiole gros yeux 65
Sépiole melon 74
Sépiole mignonne 72
Sépiole mimika 70
Sépiole naine 68
Sépiole papillon 67
Sépiole tortuette 76
Sépioles 61
Sépiolette 60
Sépiolettes 60
SEPIOLIDAE 61
Sepiolilla 60
Sepiolillas 60
Sepiolina 65
Sepiolina nipponensis 65
*_Sepioteuthis accidentalis_ 111
*_Sepioteuthis arctipinnis_ 109
Sepioteuthis australis 109
*_Sepioteuthis biangutata_ 111
*_Sepioteuthis bilineata_ 109
*_Sepioteuthis brevis_ 109
*_Sepioteuthis ehrhardti_ 111
*_Sepioteuthis guinensis_ 109
*_Sepioteuthis indica_ 109
*_Sepioteuthis krempfi_ 109
Sepioteuthis lessoniana 109
*_Sepioteuthis lunulata_ 109
*_Sepioteuthis malayana_ 109
*_Sepioteuthis mauritania_ 109
*_Sepioteuthis neoguinaica_ 109
*_Sepioteuthis ovata_ 111
Sepioteuthis sepioidea 111

PAGE

*_Sepioteuthis sieboldi_ 109
*_Sepioteuthis sinensis_ 109
*_Sepioteuthis sloani_ 111
Sevenstar flying squid 185
Sharpear enope squid 121
Sharptail shortfin squid 163
Shiny bird squid 184
Shortarm gonate squid 138
Shortclub cuttlefish 37
Siboga squid 103
*_sibogae, Doryteuthis_ 103
sibogae, Loligo (Doryteuthis) 103
*_sieboldi, Sepioteuthis_ 109
*_similis, Euprymna_ 70
*_sinensis, Sepioteuthis_ 109
*_singaporensis, Sepia_ 53
singhalensis, Loligo (Doryteuthis) 103
*_sinope, Sepia_ 34
Slender cuttlefish 36
Slender inshore squid 98
*_sloani, Notodarus sloani_ 174
sloani, Nototodarus 174
*_sloani, Ommastrephes_ 174
*_sloani, Sepioteuthis_ 111
Smallfin gonate squid 142
Smooth hooked squid 131
*_Solitosepia liliana_ 46
Southern cuttlefish 34
Southern reef squid 109
Sparkling enope squid 123
Spear squid 85
Spider cuttlefish 44
Spineless cuttlefish 57
Spiney-horn octopus 224
spinicirrhus, Tetracheledone 224
*_stearnsi, Loligo_ 95
*_steenstrupi, Dosidicus_ 181
steenstrupi, Gonatus 139
*_stenomphalus, Nautilus_ 26
*_Sthenoteuthis bartrami_ 175
*_Stigmatoteuthis arcturi_ 150
*_Stigmatoteuthis chuni_ 150
*_Stigmatoteuthis dolfleini_ 150
*_Stoloteuthis nipponensis_ 65
Stout bobtail 74
*_subaculeata, Sepia_ 44
subulata, Alloteuthis 114
*_subulata, Loligo_ 114
*_sumatrensis, Loligo_ 84
Surinam squid 105
surinamensis, Loligo 105
Swordtip squid 88
Symplectoteuthis luminosa 179
Symplectoteuthis oualaniensis 180

T

*_tagoi, Loligo_ 106
Taningia danae 124
Tehuelche octopus 208
tehuelchus, Octopus 208
*_tenera, Heteroteuthis_ 78
*_tenera, Rossia_ 78
tenera, Semirossia 78
Tetracheledone spinicirrhus 224

PAGE

*_tetracirrhus, Octopus_ 217
tetracirrhus, Pteroctopus 217
tetricus, Octopus 209
*_Theliodioteuthis alessandrini_ 121
THYSANOTEUTHIDAE 187
*_Thysanoteuthis nuchalis_ 187
Thysanoteuthis rhombus 187
*_tigris, Sepia_ 51
*_titanotus, Scaeurgus_ 217
Todarodes filippovae 166
Todarodes pacificus 167
Todarodes sagittatus angolensis 168
Todarodes sagittatus sagittatus 169
Todaropsis eblanae 164
*_Todaropsis veranii_ 164
*_Todaropsis veranyi_ 160
*_Todaropsis veranyi_ 164
*_todarus, Loligo_ 169
Tortuga bobtail 76
tortugaensis, Rossia 76
Toutenon angolais 168
Toutenon antarctique 166
Toutenon commun 169
Toutenon japonais 167
Toutenon souffleur 164
*_Tracheloteuthis riisei_ 155
Trident cuttlefish 55
trygonina, Sepia 55
*_trygoninum, Doraseplon_ 55
tullbergi, Sepia (Metasepia) 56
*_tunicata, Parateuthis_ 152

U

Umbrella squid 149
Umbrella squids 148
*_unguiculata, Cucioteuthis_ 124
*_unguiculatus, Cucioteuthis_ 124
*_unicirrhus, Octopus_ 215
unicirrhus, Scaeurgus 215
Unihorn octopus 215
Uroteuthis bartschi 115
uyii, Loligo 106

V

*_vanicoriensis, Loligo_ 180
variabilis, Octopus 210
*_variabilis, Polypus_ 210
Veined squid 90
*_velaini, Entomopsis_ 155
*_veranii, Todaropsis_ 164
*_veranyi, Todaropsis_ 160
*_veranyi, Todaropsis_ 164
*_verreauni, Amplisepia_ 32
*_verreauxi, Ascarosepion_ 46
*_Verrillida gracilis_ 155
*_Verrilliola nympha_ 155
*_vincenti, Octopus_ 194

PAGE

**volatilis, Ommastrephes* 184
volatilis, Ornithoteuthis 184
vulgaris, Loligo 107
vulgaris, Octopus 211

W

Watasenia scintillans 123
Webbed flying squid 177
Webfoot octopus 206
Wellington flying squid 174
Western Atlantic brief squid 116
Whiparm octopus 210
White-spotted octopus 204
**winckworthi, Sepia* 37

Z

zonatus, Octopus 212

10. INDEX OF LOCAL NAMES

PAGE

A

Ahtapot 204,212
Ahtopot 219-220
Akaika 168,176
Akhtaboot 212
Aluda 49
Amerika kensakiika 98
Amerika-oosurume 183
Amerikaooakaika 183
Ami-monkouika 30
Anchou souchot 68
Aoriika 111
Argentina matsuika 159
Arrow squid 99
Asia kouika 54
Atlantic bird squid 184

B

Babbucciedda 68
Babbunedda 74
Babuccia 68
Bakaika 176
Bashouika 111
Beccaficu 68
Beka 84
Bobie 68
Bone squid 98
Bou msik 220
Bougie 68
Bouzuika 75,93
Briar octopus 193
Brief squid 116
Brownstriped octopus 194
Budouika 90
Bumblebee octopus 201

C

Calamar 92,102,108
Calamarcito 78
Calamaretto 68,114
Calamaro 108
Calmar 159,170
Cape e chiuove 74
Cape'e chiuove 68
Capo di chiodo 74
Caribbean reef octopus 193
Casseron 48
Castaño 38
Castañuela 49
Chakod 48
Chambered nautilus 26

PAGE

Chêco 49
Cheung woo chak 104
Cheung yau tung 104
Chibia 48
Chin sui yau yue 88
Chiyoki 85
Chôco 49
Choco 49,68,74
Chocón 49
Chopito 51,74
Choubaï 48
Choubei 49
Chouebi 48-49
Chubei 48
Coca 49
Common New South Wales cuttlefish 46
Common octopus 212
Common squid 98
Curled octopus 219
Cuttlefish 49

D

Daai mei yau yue 111
Dakkra 68
Dangoika 70
Derinsu sübyesi 68
Dosuika 143
Dwerginktvis 68
Dyonon refui 48

E

Elédone 219
Elédone musquée 220
Encornet 108

F

Fa gai na 45
Fabiana 193
Faux encornet 161
Foo baan woo chak 52
Fotesa 68
Frajjel 204
Frenética 68
Fuiripinsurumeika 173

G

	PAGE
Gam woo chak	40
Ganzeki	168
Garnet	212
Gemeiner Tintenfisch	48
Gewone Inktvis	48
Gitchyoika	45
Glaouchau	68
Globito	68,74
Golden arrow squid	165
Gotouika	89
Gould's squid	171

H

Habbar	108
Hariika	40
Harinashikouika	58
He'e	196
Hidokoika	70
Hiika	93
Himekouika	41
Hirakensakiika	86
Hobotnika	212
Hokkaisurumeika	170
Hotaruika	123

I

Izuika	111

J

Jam mak yue	30,40,54
Jhindouika	93
Ji dako	206
Jibia	49
Jibión	49
Jikoika	70
Jumbo flying squid	183
Jumbo squid	183

K

	PAGE
Kalamari	108,170
Kalmar	108,170
Kalmas	161
Kaminariika	45
Kanadairekkusu	163
Kariforunia yariika	96
Karnita tal misk	220
Kensakiika	89
Khtapódi	204
Khtapodi	212
Klamar	108
Kleiner Tintenfisch	68
Kobuika	45
Kobushime	42
Koika	93
Kora katitza	49
Kouika	40
Kubushime	42
Kuragedako	150
Kutsuika	111

L

Laai por	216
Leung yee jai	69
Lignja	108
Lignjun	170
Lilliput longarm octopus	197
Little squid	114
Lomo anaranjado	179
Long-finned squid	98
Long-tailed flying squid	184
Luda	49
Lula	91
Luminous flying squid	180
Luria	114

M

Ma dako	212
Maika	40
Mak dau	56
Mak gung	45
Mak mo	52
Malnascui	68
Margade	48
Market squid	96
Maruichi	45
Matsuika	123,168
Mawashikko (juveniles)	89

PAGE

Medama 176
Mehikariika 89
Mettik 108
Mimiika 70
Minamisurumeika 175
Mizo dako 199
Mizuika 111
Mo jam woo chak 58
Moika 111
Mongoika 48
Mongouika 45,52
Morralet 68
Moscardino bianco 219
Moscardino rosso 220
Moscoctapoda 219-220
Mugiika 168
Murasakiika 176
Muscardin 220
Mustekala 48
Muzgavac 220

N

Neon flying squid 176
New Zealand arrow squid 175
Ngor huet mak 58
North Atlantic octopus 222
North Pacific giant octopus 199
Northern shortfin squid 163
Nyujirando - minamisurumeika 175
Nyujirandosurumeika 175

O

Octapodi 204
Octopod 212
Octopodi 212
Octopus 209
Ootobiika 188
Opalescent inshore squid 96
Orangeback flying squid 179
Osminog 204,212

P

Passamar 170
Passamas 161

PAGE

Petit encornet 114
Pieuvre 212
Pignatta 74
Polpessa 204
Polpessa di rena 197
Polpo 212
Porpo-seppia 68
Pota 68,170
Poulpe 204
Poulpe de roche 212
Poulpe sèche 68
Pruppusiccia 48
Pugnatta 74
Pulpe 212
Pulpo 207-208,212
Pulpo almizclado 220
Pulpo blanco 219
Pulpo judio 197
Pulpo patudo 204
Purpessa de funna 74
Purpissa 219
Purpleback flying squid 181
Purpo seccia 74
Purpu 212
Pygmy octopus 202

Q

Qarnit 219
Qarnit kbir 204,212
Qarnita 212
Queen squid 94

R

Red ocean squid 176
Rellena 49
Relleno 49

S

Saa liu 192
Sabbidije 48
Sasaika 85
Sayanaga 85
Scarpetta 48,68
Scarpitelle (juveniles) 48
Scarpitta 48
Scartoccio 68
Scuttle 212

PAGE

Secce 48
Seccetella 48,68
Seche 49
Sei ngaan liu 206
Seiba 48
Seich 48
Seiche 48-49
Sepa 48
Sepia 48-49
Sepia imperiale 48
Sepie 48
Sepieta 68
Sepietta 68
Sepija 48
Sepiola 68
Sépiole 68,74
Sepiolina 68
Sepion 68
Sepiou 68
Sepioun 68
Seppa 48
Seppetta 68
Seppia 48
Seppia elegante 38
Seppia pizzuta 51
Seppio 48
Seppiola grossa 74
Seppiolo 68
Shakuhachiika 85
Sharptail shortfin squid 164
Shirikusari 58
Shiriyakeika 58
Shiroika 90,111
Short-finned squid 163
Shoubia 48
Sibia 49
Sicca 48
Siccia 48
Sipa 49
Sipia 49
Sipionet 49
Slender inshore squid 99
Sobbeit 48,108
Sodeika 188
Soubia 49
Soupia 48
Soupitza 68
Sponce currienti 68
Striped squid 180
Sübye 49
Sui gwai 204
Sujiika 180
Sumïika 40
Süpia 48
Supieta 68
Süpiola 68
Surumeika 168

T

Taiseiyoirekkususurume 163
Taiseiyoitekkususurume 161
Taiseiyosurume 161,163,170

PAGE

Takoika 140-141
Tantena 68
Taruika 188
Tenashi 85
Teppo 85
Thrapsallo 170
Thumbstall squid 116
Tobi-ika 184
Tobiika 181
Tonkyu 168
Tor yau yue 86,89
Torafukouika 52
Totanino 68
Totanitu 114
Totano 170
Totano volatore 161
Totanu 108
Totariello 114
Totlu bajdani 170
Totlu hammari 161
Tracan 204
Tsubekusari 58
Tsumeika 129
Tsutsuika 85
Tutariedde 68

U

Unihorn octopus 215

V

Volador 161
Vurpascele 74

W

Webbed flying squid 177
Western Atlantic brief squid 116
White-spotted octopus 204
Winter squid 98

PAGE

Y

Yanagi dako 195
Yariika 85
Yasetobi-ika 184
Yat boon yau yue 168
Yau jai 88,106
Yellow-backed squid 181
Yi muk woo chak 45
Yoroppa kouika 48
Yoroppairekkusu 161
Yoroppasurumeika 170

Z

Zeekat 48
Zotoleto 68
Zotolo 68
Zula 68

CHRISTENGRAF / ROMA

M-40
ISBN 92-5-101382-9